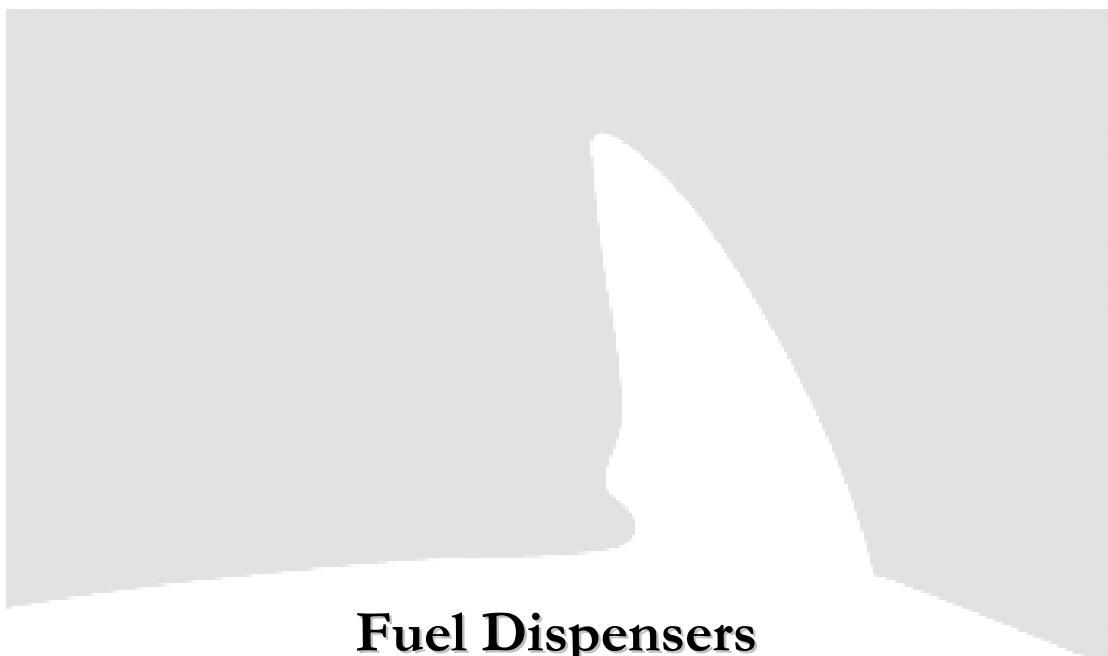


TATSUNO-BENČ EUROPE A.S.



**Fuel Dispensers
of liquefied petroleum gas
BMP500.S/LPG and BMP2000.S/LPG
version SHARK**

Installation and User Manual

INSTALLATION AND USER MANUAL

Fuel Dispensers of Liquefied Petroleum Gas BMP500.S/LPG and BMP2000.S/LPG version SHARK

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LIST OF CONTENTS

0. INTRODUCTORY INFORMATION	1
0.1. PICTOGRAMS AND TERMS USED IN THE MANUAL	1
0.2. READ THE MANUAL THOROUGHLY FIRST	2
0.3. PERMITTED SCOPE OF USE	2
0.4. BRIEF CHARACTERISTICS OF THE USED MEDIUM	3
1. LPG DISPENSERS TATSUNO-BENČ	5
1.1. BASIC SPECIFICATIONS	5
1.2. FUEL DISPENSER DESCRIPTION	6
1.3. SURVEY OF AVAILABLE TYPE MODELS	7
1.4. FUEL DISPENSER TERMINOLOGY AND RATING PLATE	8
2. INSTALLATION	11
2.1. OCCUPATIONAL SAFETY INSTRUCTIONS	11
2.2. ARRIVAL, TRANSPORTATION, UNPACKING	11
2.3. FUEL DISPENSER INSTALLATION AND LAYOUT	12
2.4. MECHANICAL FUEL DISPENSER MOUNTING	12
2.5. FUEL DISPENSER EL. WIRING	12
2.5.1. <i>Switching of LPG Pump</i>	13
2.5.2. <i>Feeding of Electronic Unit and Switching Elements</i>	13
2.5.3. <i>Communication Line</i>	14
2.5.4. <i>Characteristic Features of Cables</i>	15
3. BASIC FUNCTIONS AND DISPENSER SETTING	17
3.1. PDE CALCULATOR	17
3.1.1. <i>Remote Fuel Dispenser Control</i>	18
3.1.2. <i>Setting of Parameters on Dispenser with Fuel Volume Display</i>	19
3.1.3. <i>Data Monitoring in Setting Mode</i>	19
3.1.4. <i>Operator Mode</i>	20
3.1.5. <i>Manager Mode</i>	20
3.1.5.1. <i>Non-resetable totalizers (code 01)</i>	21
3.1.5.2. <i>Daily totalizers (code 02)</i>	21
3.1.5.3. <i>Fuel Product Unit Prices (code 03)</i>	22
3.1.5.4. <i>Current Time and Date (code 04)</i>	22
3.1.5.5. <i>Displaying of Program Version and Check Sum (code 05)</i>	22
3.1.5.6. <i>Displaying of Latest Error Conditions of Fuel Dispenser (code 06)</i>	22
3.1.5.7. <i>Displaying of History of Dispensing (code 07)</i>	23
3.1.5.8. <i>Access Password (code 08)</i>	23
3.1.5.9. <i>History of Maintenance (code 09)</i>	24
3.1.5.10. <i>Operating Fuel Dispenser Mode (code 12)</i>	24
3.1.5.11. <i>Error Statistics (code 13)</i>	24
3.1.5.12. <i>Current Operating Temperature (code 14)</i>	25
3.1.5.13. <i>Daily Totalizer Resetting (code 15)</i>	25
3.1.5.14. <i>Operating Check Number (code 16)</i>	25
3.1.5.15. <i>Text messages (code 18)</i>	25
3.1.5.16. <i>Displaying of Display Segment Error (code 19)</i>	27

3.2. CALCULATORS PUMA HT-TE AND PUMA MPD.....	27
3.3. CALCULATORS ADP/M AND ADPMPD/M.....	28
4. OPERATION.....	31
4.1. INSTRUCTIONS FOR SAFE OPERATION	31
4.2. PUTTING LPG DISPENSER INTO OPERATION	32
4.3. OPERATION OF LPG FUEL DISPENSER	32
4.3.1. <i>Vehicle Refueling by LPG</i>	32
4.3.2. <i>Safety of LPG Fuel Dispenser Operation</i>	33
4.3.3. <i>Pre-selection Keyboard</i>	33
4.3.4. <i>Electromechanical Litre Totalizers</i>	34
4.3.5. <i>Fuel Dispenser Display Back-lighting</i>	34
4.3.6. <i>Signaling Diode SIG on the Display</i>	34
4.3.7. <i>Signaling Diode PWR on the Display</i>	34
4.4. END OF LPG FUEL DISPENSER OPERATION	34
5. MAINTENANCE AND SERVICE.....	35
5.1. SURVEY OF MAIN PRINCIPLES OF LPG FUEL DISPENSER MAINTENANCE:.....	35
5.2. PRINCIPLES OF LPG FUEL DISPENSER CHECKING	36
5.3. FUEL DISPENSER ERROR MESSAGES	36
5.4. LPG FUEL DISPENSER SERVICE	36
5.5. WARRANTY AND COMPLAINTS	37
5.6. ACCESSORIES	37

APPENDICES

- APPENDIX A - TECHNICAL PARAMETERS
- APPENDIX B - DISPENSER TYPE MODELS
- APPENDIX C - DIMENSIONS & WEIGHTS
- APPENDIX D - ERROR MESSAGES
- APPENDIX E - FIGURES OF LPG DISPENSERS
- APPENDIX F - FOUNDATION PLANS & FRAMES
- APPENDIX G - ELECTRICAL SCHEMES
- APPENDIX K - CERTIFICATES
- APPENDIX L - LPG FILTER CHANGE

0. Introductory Information

0.1. Pictograms and Terms Used in the Manual

Symbols used in the Manual:



Caution



Explosion hazard



Caution - El.
equipment



No smoking



No open fire



No mobile phones

The terms used in the Manual which special attention should be paid to:

CAUTION

Breach of requirements shown under the heading can result in creation of the conditions leading to injury or death of persons or to material damage to property.

WARNING

Breach of requirements shown under the heading can lead do injury of persons and/or can result in fuel dispenser damage.

ATTENTION

The text shown under the heading draws attention to the mandatory and/or statutory requirements which assembly and use of the fuel dispenser is governed by. Breach of these requirements can create dangerous situation and/or can result in fuel dispenser damage.

NOTE

The text shown under the heading draws attention to the assembly procedures, processes and operating methods, etc., which are important for correct assembly and correct fuel dispenser operation and which, when breached, can result in damage, failure or bad fuel dispenser performance.

0.2. Read the Manual Thoroughly First

Read the relevant parts of the Installation and User Manual prior to start installing or operating the fuel dispenser. Consider all hazards, attentions and notes contained in the Manual.

The manufacturer has compiled the Installation and User Manual to grant the necessary information and instructions facilitating complete and effective installation, operation and maintenance of your fuel dispensers of the type series BMP500.S/LPG and BMP2000.S/LPG.

The Manual worked out by the manufacturer is the integral part of fuel dispenser accessories.

The user is liable fully for use of the Manual; any and all operations not described here shall be considered forbidden. The operator carrying such operations shall be liable fully for consequences of his/her actions.

The Manual is arranged in individual sections broken down to the sub-sections so that each topic may be independent and may correspond to the operating logic (learn - prepare - use - maintain).

The Manual reflects truly the technical state as to the date of fuel dispenser sale and cannot be considered non-conforming due to follow-up changes and updating carried out on the basis of the latest facts.

ATTENTION

MAINTAIN THE MANUAL AND ATTACHED DOCUMENTS FOR THE WHOLE TIME PERIOD OF FUEL DISPENSER OPERATION FOR POSSIBLE FUTURE REFERENCES!

0.3. Permitted Scope of Use

The fuel dispensers of the series BMP500.S/LPG and BMP2000.S/LPG are specified for stationary installation for vehicle refuelling by liquid propane-butane (LPG) from the tanks in the preset volume.

CAUTION

The fuel dispenser is a complex device which must fulfill a number of demanding functions. **It is therefore necessary to clean the tanks, pipe distributions and carry out check for fuel purity (dirty filters in the dispenser cannot be considered the reason for warranty repairs!) prior to putting the dispenser into operation. Prior to activating, inspection of el. power distribution and check for correct wiring have to be carried out to prevent electric shock and to provide explosionproofness.**

Each fuel dispenser has been tested from the points of its function, safety and metrology by the manufacturing plant. Delivery of each individual fuel dispenser is accompanied by the certification documents which shall be submitted to the competent authorities by the user, if asked to do so.

0.4. Brief Characteristics of the Used Medium

LPG is the trade name for liquefied mix of light hydrocarbons, predominantly with three to four carbon atoms in the molecule. LPG is obtained by synthetic petrol production and recently also by natural gas processing. The liquefied LPG is a clear easily volatile liquid of specific odor.

By releasing overpressure the liquefied LPG is evaporated quickly and flammable gas, roughly twice as heavy as air, is generated. By evaporation of 1 m³ of liquefied LPG (ca 550 kg) into air ca 12.400-83.330 m³ of explosive mix, heavier than air and accumulated close to the earth, is generated (gas dissolving at the bottom explosion limit).

Physical properties of liquid state	propane	butane
formula	C ₃ H ₈	C ₄ H ₁₀
molecular weight	44.09	58.12
boiling temperature (°C)	-42.6	-0.6
density (kg/m ³ at 20°C)	502	579
Physical properties of gaseous state		
density (kg/m ³ at atmospheric pressure)	1.865	2.76
consistency (air = 1)	1.562	2.091
LHV (MJ/m ³ at 0°C and atmospheric pressure)	93.57	123.76
Explosion limit, when mixed with air, in % vol.		
bottom	1.7	1.3
upper	10.9	9.3
ignition temperature in °C	465	365

Table 1 - Physical properties of main LPG mix components

Physical properties of the LPG mix depend on properties of individual constituents. The liquid LPG has similar properties as petrol. i.e. dissolves and dries seals of natural rubber, organic lubricants, oil varnish and other related substances. Synthetic rubber, graphite packing, Teflon mass, etc. are resistant to LPG. Teflon tapes or LOCTITE product are used for sealing of threaded joints in contact with liquid and gaseous LPG. Use of spirit sealing compounds or lamp black cements (HERMETIC, HERMOSAL) result in problematic dismantling of this way sealed joints. Teflon sealing rings or Klingerit (applicable for LPG) are suitable for flange joints.

Gaseous LPG has moderately narcotic effect on the human organism. Breathing of gaseous LPG causes, after some time of action, headache, nausea, weariness, dissipated attention, drowsiness. If not ignited, the gaseous LPG may cause suffocation of the operators, though it is not poisonous directly, like e.g. the city gas. As it is heavier than air, it is accumulated close to the earth and in the recesses and the laying person (lost consciousness in case of injury, etc.) may occur in the oppressive atmosphere. Gaseous LPG also causes skin degreasing.

The liquefied LPG is evaporated - after the steep drop of overpressure to the atmospheric pressure (e.g. leak of the liquefied LPG out of the device) - by boiling under the temperature of -42°C, and therefore contact of the skin with the liquefied LPG results in frostbites.

1. LPG Dispensers TATSUNO-BENČ

1.1. Basic Specifications

Dispensed medium		liquid propane-butane
Max. flow rate	Q_{\max}	50 dm ³ . min ⁻¹
Min. flow rate	Q_{\min}	5 dm ³ . min ⁻¹
Min. volume of refueling	V_{\min}	5 dm ³
Cyclic volume	V_c	0.5 dm ³
Operating pressure	p	1.6 MPa
Max. operating pressure	p_{\max}	1.8 MPa
Rated pressure	p_N	2.5 MPa
Test pressure	p_z	4.0 MPa
Accuracy of dispensing		± 1%
Operating temperature of the ambient air		- 30 ÷ + 50°C
Operating temperature of the medium		- 20 ÷ + 50°C
Inner diameter of the piping		
	inlet piping	DN 19
	return piping	DN 16

Electronic calculator:

Power	~230 V; +10% -15%; 50 Hz ± 5 Hz max. 84 VA
Electromagnetic valves	~230V AC; 50 Hz; 5W standardly ~24V AC; 50 Hz; 5W for Puma HT-TE and Puma MPD +24V DC; max.0.500A for propor.valves

Displays:

a) 7-segments LCD displays with LED backlight (type PDLEDIL)

figure height	volume	0.01 až 9999.99 dm ³
	amount	1 to 999999 currency unit
	unit price	1 to 9999 currency unit /dm ³
	amount	2,54 mm (1")
	volume	2,54 mm (1")
	unit price	2,54 mm (1")

b) Alphanumeric LCD displays with LED backlight (type PDELCD) - only for BMP2000.S/LPG

figure height	volume	0.01 to 9999.99 dm ³
	amount	1 to 999999 currency unit
	unit price	1 to 9999 currency unit /dm ³
	amount	40 mm (1")
	volume	2,54 mm (1")
	unit price	2,54 mm (1")

Electromechanical volume totalisers

0000000 - 9999999 dm³

1.2. Fuel Dispenser Description

The LPG dispensers TATSUNO BENČ, version SHARK, have the body parts (guards, doors, covers...) made of fireproof laminate (reinforced plastic) approved for the scope of use by the State Test Laboratory (Certificate of FTZÚ 04ST 0083). Supporting dispenser skeleton parts are made of steel lacquered sheet 0.8 - 1 mm thick and/or of stainless sheet. Standard colour version of the fuel dispensers TATSUNO BENČ: combination of white (MM710) and grey colour (RAL7040). Each fuel dispenser is equipped by the **hydraulic unit** of the Japanese company TATSUNO. We are speaking about the time-tested type of hydraulic unit accepted globally characterized by high reliability and long total service life. The system of guards comprises the roof, separating grid and register cubicle. It covers the hydraulic unit module in the top part and is completed by the masks with the locks. The masks accommodate dials with displays. The **pulse generator** TATSUNO is installed on the **piston meter**. The measuring unit, consisting of the meter itself, **filter**, **separator**, liquid phase non-return valve and gaseous phase safety valve, is mounted on the meter bracket in the bottom hydraulic unit module part. The **safety valve** set to the pressure of 1.8 MPa prevents exceeding of the max. operating pressure by transferring the liquid phase back into the storage tank. The differential valve maintaining the medium in the meter in the liquid state is mounted at the meter outlet. This can be reached by step-by-step pressure balancing after start of refueling. The measuring unit is completed by the closing ball cock G ¾" at the inlet. The pumped medium passed through the meter and differential valve, is led through the sight glass, break-through safety coupling into the hose and via the nozzle it is transported into the fuel tank of the vehicle. Possible gaseous constituents are separated in the separator and returned (via the safety valve) into the return piping (DN 16) connected with the storage tank. The ball cock G ½" is the integral part of the return piping. The filling pressure can be monitored on the manometer placed under the nozzle suspension hook.

The **rotary four-piston meter** is of horizontal design with vertical crankshaft. The liquid enters the top meter part and is distributed to each piston by the rotary slide valve fixed on the crankshaft. The pistons move under pressure in the graduated cylinders, which motion is converted by the crankshaft into the rotary motion (one meter shaft revolution = 0.5 dm³). The opto-electronic pulse generator registers the motion, converts it into el. pulses which are processed by the electronic register. The measured liquid is led away via the rotary slide valve and the crankcase. The meter is calibrated by the adjusting handwheel on the graduated cylinder cover. The measure error can be eliminated by adjusting the piston stroke. When swiveling the wheel clockwise, the delivered volume will be reduced and vice versa (swiveling counterclockwise the delivered volume will be increased). One wheel division represents setting by 0.08 % of the delivered volume. The flow meter accuracy lies in the range of ± 1 % of the delivered volume.

The pumped medium (LPG) is delivered by the pump placed off the fuel dispenser zone; it flows through the safety electromagnetic valve (if any), through the ball cock and **filter** into the **separator**. If the medium comprises gaseous constituents, they will be separated and returned from the top separator part by the return piping, which has to be opened if the dispenser is running, back to the storage tank. ID of the return piping must be DN 16. The zone of the gaseous differential valve phase is connected with the return piping. From the separator the liquid flows via the return valve into the piston meter and - through the differential valve and the sight glass with the break-through coupling - into the dispensing hose and nozzle. The electronic register processes pulses from the generator and transmits them to the displays (LCD or FP), where the dispensed volume, price and volume unit price is displayed. In case of power failure the data on LCD displays are maintained for min.15 minutes.

The LPG dispenser is equipped by PDE el. calculator as a standard. Besides the PDE register the calculators Puma HT-TE, Puma MPD, or BetaControl ADP/M and ADPMPD/M can be used as well. The fuel dispensers can be operated in the **manual mode**, without the control system, or connected via the communication line to the cash desk (POS) system of the filling station. If requested by the customer, the fuel dispenser can be equipped by volume and price pre-selection (prepay) and/or by the thermal correction unit.

Pre-selection

All fuel dispensers can be equipped by special electromagnetic deceleration valves, guaranteeing precise price and fuel quantity pre-selection and by a clearly arranged 4- key keyboard, enabling price or fuel pre-selection by the customer directly on the fuel dispenser.

Temperature Correction System

The fuel dispensers BMP500.S/LPG and BMP2000.S/LPG can be equipped by the temperature correction system of dispensed volume. The separator accommodates the well with the temperature sensor monitoring

temperature of the passing medium. The information is transmitted to the el. register where re-calibration takes place depending on the preset volume/temperature ratio.

Special Color Version

In addition to the standard white fuel dispenser version the products can be delivered in any color version at the customer's wish (color pursuant to RAL, CSN, Colorlak scale or a specially prepared color). The special color is delivered at the extra charge, the level of which depends on the type and shade of the requested color.

1.3. Survey of Available Type Models

The LPG dispensers TATSUNO BENČ version SHARK, are manufactured in several type series:

- type series BMP500.S /LPG - variety SHARK with height of 1400mm
- type series BMP2000.SS /LPG - variety SHARK with height of 1600mm
- type series BMP2000.SM /LPG - variety SHARK with height of 1900mm

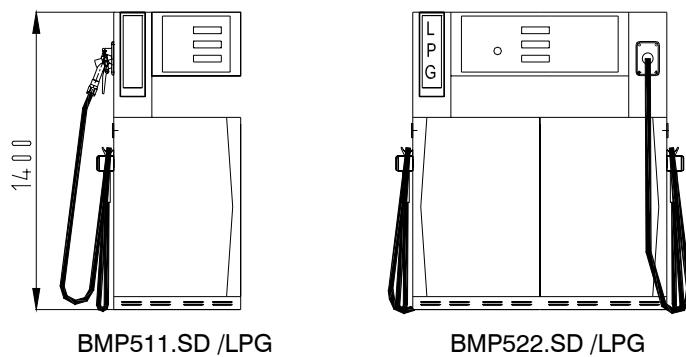


Fig 1 – Series BMP500.S/LPG

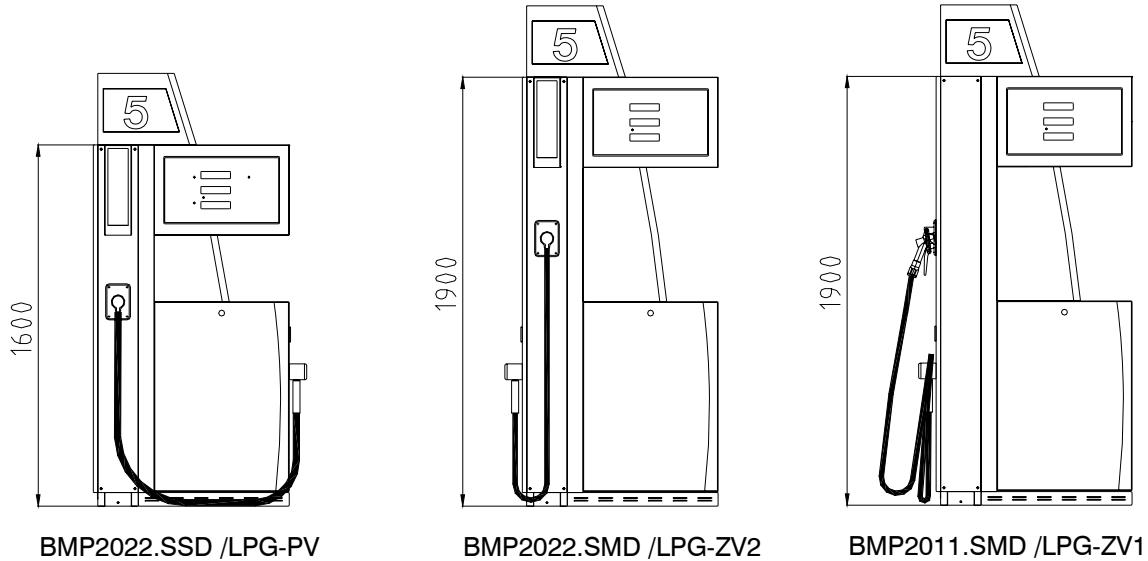


Fig 2 – Series BMP2000.S/LPG

Tables of all variants of LPG dispenser type series are contained in the Appendix B, figures of LPG dispensers can be found in the Appendix E.

1.4. Fuel Dispenser Terminology and Rating Plate

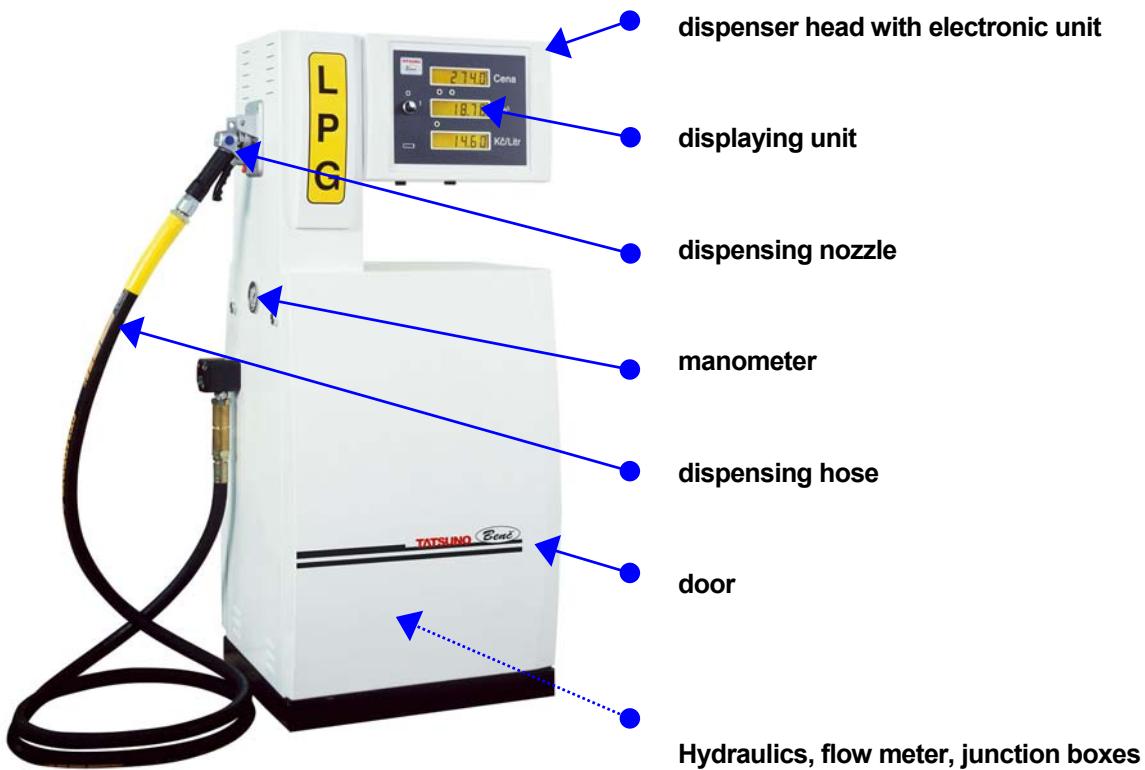


Fig. 3 - Terminology of basic dispenser assemblies



Fig. 4 - Rating plate of the LPG dispenser

Information on the Rating Plate

TATSUNO-BENČ EUROPE a.s.	Name and address of fuel dispenser manufacturer
	Designation of the dispenser means that it has been designed, manufactured and marked in conformity with EC Guidelines. The dispenser is subject to certification of type examination pursuant to the Guideline 94/9/EC – ATEX, carried out by the Notified Body No. 1026 – FTZÚ Ostrava Radvanice (see EC Certificate of Conformity and Quality Assurance Certificate - Appendix K)
VÝDEJNÍ STOJAN NA KAPALNÁ PALIVA - LPG	Scope of use of the device
MODEL BMP	Designation of fuel dispenser type (see the Appendix B)
TYP. ČÍSLO TCM	No. of the Certificate of dispenser type approval - ČMI (Czech Institute of Metrology)
ES CERT. TYPU Č.	No. of the Certificate of the type examination – FTZÚ Ostrava-Radvanice (see EC Certificate of Type Examination – Appendix K)
$Q_{\max} 50 \text{ dm}^3 \cdot \text{min}^{-1}$	Hydraulic and metrologic parameters
	Marking of explosion-protected el. equipment: II 2 – equipment for explosion hazard rooms other than the mines, probability of creation of the explosive atmosphere - zone 1 G – explosive atmosphere created by gases, vapours or mists IIA – gas group – least dangerous T3 – max. temperature of el. equipment which might cause ignition of the ambient atmosphere (200°C)
VÝROBNÍ ČÍSLO	Serial number of the fuel dispenser (order number /year of production)
electromagnetic valves power supply	+24VDC or 24VAC; 50Hz or 230V AC; 50Hz
Lighting power supply	230V; 50Hz

2. Installation

2.1. Occupational Safety Instructions



CAUTION

- The equipment has to be installed by the staff qualified and authorized pursuant to relevant standards, regulations, local limitations and pursuant to the Manual.
- Smoking and open fire handling is prohibited in the vicinity of the dispenser.
- Always adhere to the rules for LPG handling.
- Monitor all leaks in the dispenser. Should you establish fuel leaks, disconnect power supply line and contact the service organization (see Section 5).
- El. wiring must be carried out by the qualified staff.
- Assure that the operable fire extinguisher is available.
- When handling the device, use suitable protective aids.

2.2. Arrival, Transportation, Unpacking

The customer shall agree the method of dispenser dispatch with the manufacturer. Should the transportation be provided by the company TATSUNO-BENČ EUROPE a.s., the product will be transported to the agreed place of destination. The manufacturer has adequate knowledge of the method of transportation and handling. Should the transport be provided by another method selected by the customer, the manufacturer shall provide professional loading, but is not liable for the method of transportation. It is established in general that the fuel dispenser must be transported packed duly, always fixed on the frame. The dispenser must be fixed on the vehicle and protected from damage (guards, paints), displacement and overturning. Handling and transportation must be done in vertical position only, the dispenser may not be put on the guards.

WARNING

When handling the dispenser, only and exclusively high-lift trucks may be used. TATSUNO-BENČ EUROPE a.s. is not liable for possible damage, if other handling devices are used !

2.3. Fuel Dispenser Installation and Layout

ATTENTION

Dangerous zones are determined according to EN 60079-10 round the fuel dispenser.

Dispensers of series BMP500.S/LPG and BMP2000.S/LPG may not be placed in the dangerous zone. El. calculators, used in these dispensers are of uncased version, are placed in the explosion-protected zone and separated from all other zones by the partition of type 1 according to EN 13617-1.

CAUTION

Taking in view security of operation, the fuel dispenser has to be installed by the hose in the direction of filling station (refueling point) exit ! (see the Appendices E and F)

2.4. Mechanical Fuel Dispenser Mounting

CAUTION

Driving LPG out of the fuel dispenser and piping (e.g. during disassembly) is carried out by nitrogen or inert gas. Driving LPG out by air or oxygen is prohibited!

The fuel dispensers are fixed to the special foundation frames by the anchor bolts delivered with the dispenser. The foundation frame is out of scope of standard dispenser equipment, but can be ordered additionally. The foundation frame is seated into the concrete on the island, then the front and rear fuel dispenser casings are removed, the dispenser is placed on the foundation frame and fixed by the fixing screws.

2.5. Fuel Dispenser El. Wiring

El. wiring of fuel dispensers TATSUNO BENČ requires protection against accidental el. shock (pursuant to the standard ČSN 34 1010) and distribution of relevant el. cables to each individual fuel dispenser. All fuel dispensers in the filling station shall be interconnected by the conductor earth electrode and connected to the grounding network.. The yellow and green conductor, section of min. 4 mm² or a special ribbon conductor can be used as the conductor earth electrode. The conductor earth electrode must be connected to the central grounding terminal of the fuel dispenser placed on the foundation (screw M10), marked correspondingly.

ATTENTION

All el. cables must have good insulating properties, because they are subject to aggressive explosion-hazard environment for a long time period. For these purposes the manufacturer recommends the cables of CMSM and CMFM types.

NOTE

Ends of all cables entering the fuel dispenser must be long enough to facilitate installation (cable termination in the junction box) - each cable must end at least 3 m above the ground.

From the point of applied voltage and function the cables can be broken down to power (supply) and signal ones.

Power cables:

- switching of liquid gas pump
- feeding of calculator and switching components (valves)

Signal cables

- communication lines
- complementary service lines (pulse outlets, etc.)

2.5.1. Switching of LPG Pump

Switching of liquid gas pump motor is carried out for both LPG dispenser series BMP500.S/LPG and BMP2000.S/LPG by the 3-core cable CMSM 3C x 1.5 (for one-nozzle dispensers) or by CMSM 4B x 1.5 (for two-nozzles dispensers). Cable is connected from the main switchboard in the kiosk to each individual fuel dispenser - into the junction box (see Appendix G).

Marking of conductors in cable CMSM 3C x 1,5		
marking	color	description
SL	brown	switching phase of LPG pump
SN	light blue	switching voltage (max 250V/1A)
PE	green/yellow	protective conductor

Table 2 – Switching of LPG pump

Označení vodičů v kabelu CMSM 4B x 1,5		
označení	barva	popis
SL1	černý 1	switching phase of LPG pump no.1
SL2	černý 2	switching phase of LPG pump no.2
SN	hnědý	switching voltage (max 250V/1A)
PE	zelenožlutý	ochranný vodič

Table 3 – Switching of LPG pump

NOTE

Relay or motor contactor is used in LPG fuel dispensers for switching the LPG pump. The switching voltage on the contacts should not exceed the value of 250V and the switching current - the value of 1A.

2.5.2. Feeding of Electronic Unit and Switching Elements

The stabilized feeding of electronic calculator and non-stabilized feeding of switching elements is separated in all fuel dispensers, where the electronic calculator PDE (TATSUNO-BENČ EUROPE a.s.) or the calculators ADP/M and ADPMPD/M (BETA Control s.r.o.) are used.

Feeding of the calculator and switching circuits is done by the 5-core cable **CMSM 5C x 1.5**, which is always led from the main switchboard in the kiosk onto the first dispenser module in the junction box (wiring of junction boxes - see the Appendix G). The cable contains stabilized calculator feeding and non-stabilized switching element feeding (and/or auxiliary heating bodies).

The 3-core cable **CMSM 3C x 1.5** (Ns, Lt, PE) which is led from the main switchboard in the kiosk always into the junction box of the fuel dispenser (wiring of junction boxes - see the Appendix G) is enough for feeding of the calculator in the fuel dispensers where the calculators of Puma HT-TE or Puma MPD type of the company Gilbarco Veederoot are used.

Marking of conductors in cable CMSM 5C x 1.5		
marking	colour	description
Ns	black 2 - light blue	neutral wire of stabilized calculator feeding
Ls	brown	phase 230V of stabilized calculator feeding
Nt	light blue	neutral wire of switching elements feeding
Lt	black 1	phase 230V - switching elements feeding
PE	yellow and green	protective conductor

Table 4 – Feeding of calculator (PDE, ADP/M) and switching elements

Marking of conductors in cable CMSM 3C x 1.5		
marking	colour	description
Ns	light blue	neutral wire of stabilized calculator feeding
Ls	brown	phase 230V of stabilized calculator feeding
PE	yellow and green	protective conductor

Table 5 – Calculator feeding (Puma HT-TE, PUMA MPD)

Feeding of switching elements 230V is led from the fuel dispenser into the main switchboard, where it is connected to the phase 230V through the circuit breaker (230V, 2A).

Feeding of the calculator is led from the fuel dispenser into the main switchboard, where it is connected to the common bus bar for all fuel dispensers through the circuit breaker 230V (230V, 2A). From hence feeding for all fuel dispensers is led into the stabilized standby source, which will feed the fuel dispenser electronic unit for min. 3-5 minutes in case of power drop-out.

The **stabilized source** is fed by 230V through the circuit breaker (230V, 10A).

NOTE

It is necessary to separate zero conductors in the switchboard from switching component feeding and from stabilized calculator feeding (a separate zero bridge).

2.5.3. Communication Line

The communication line serves for remote fuel dispenser controlling in the so called automatic mode (i.e. the dispenser is controlled remotely by the console or computer). The line need not be installed if the dispenser is operated in the manual mode only.

ATTENTION

For the communication line of both fuel dispenser series BMP500.S/LPG and BMP2000.S/LPG - at least the four-core shielded communication cable of the min. cross conductor section of 0.5 mm² must be used!!!.

As the communication line e.g. the 4-core shielded cable CMFM 4D x 1.5 can be used; the cable is led from the operator's workplace in the kiosk into communication junction box of the dispenser (wiring of communication boxes for individual electronic calculator types - see the Appendix G).

Communication Line Wiring

The method of wiring of the communication line from the kiosk to the fuel dispenser and its connection to the junction box depends on the type of the calculator used in the dispensers and therefore it is necessary to know the type of the calculator to be used in the fuel dispensers. The electronic calculator **PDE** of the company TATSUNO-BENČ EUROPE a.s is installed in all dispensers as the standard. The calculators **ADP** and **ADPM** of the company Beta Control or the calculators **PUMA HT-TE** and **PUMA MPD** of the company Gilbarco Veederoot can be used as a variant. If the interface **IFSF-LON** is used for communication with the fuel dispensers, then connection and wiring of the junction box is identical with connection for the calculator PDE.

Marking of conductors in cable CMFM 4D x 1,5 – Calculator PDE		
marking	colour	description
A	brown	communication line A (+5V DC) or NET A (IFSF LON)
B	light blue	communication line B (-5V DC) or NET B (IFSF LON)
-	black 1	not used
-	black 2	not used
ST	shielding	cable shielding

Table 6 - Communication cable – calculator PDE or calculators IFSF-LON

Marking of conductors in cable CMFM 4D x 1,5 – Calculator ADP or ADPMPD		
marking	colour	description
D(-)	brown	communication line DATA(-)
D(+)	light blue	communication line DATA(+)
0V	black 1	signal ground
-	black 2	not used
ST	shielding	cable shielding

Table 7 - Communication cable – calculators ADP/M and ADPMPD/M

Marking of conductors in cable CMFM 4D x 1,5 - Calculator Puma HT-TE or Puma MPD		
marking	colour	description
TX	brown	communication line TX
RX	light blue	communication line RX
AM	black 1	signal Auto/Manual
0V	black 2	signal ground
ST	shielding	cable shielding

Table 8 - Communication cable – calculators Puma HT-TE and Puma MPD

There are two basic methods of wiring of the communication line between individual fuel dispensers and the control unit (computer) in the filling station:

- a) **Series connection** (LPG dispensers with PDE, ADP/M and ADPMPD/M calculator) – the communication cable is led from the point of the control computer in the kiosk (service panel) into the communication junction box of the first dispenser. From hence the cable is led into the junction box of the next dispenser, etc. until all dispensers in the filling stations are interconnected. A single communication line is necessary for interconnection of all dispensers in the station.
- b) **Star ("Y") connection** (LPG dispensers equipped by the calculator Puma HT-TE and Puma MPD) – the communication cable is led from the point of the control computer in the kiosk (service panel, concentrator) star-like into the communication junction boxes of all dispensers. The number of communication lines, necessary for interconnection of all fuel dispensers, equals to the number of fuel dispensers in the filling station.

Service Line

The service line serves for special purposes. The line is not necessary for operation of the dispenser, but is used, if certain dispenser functions need to be controlled remotely or if certain signals have to be led out of the dispenser:Necessity of installation of the service line shall always be consulted with specialists of the company TATSUNO-BENČ EUROPE a.s. Multi-core shielded cables CMFM (1.5 mm²) are recommended for the service line.

2.5.4. Characteristic Features of Cables

Cable type	Function	Number of wires	Rated current [mm]	Color version of wires	Possible equivalent
CMSM 3C x 1,5	LPG pump switching	3	18	ZŽ, H, SM	CMSM 3C x 2,5
CMSM 4B x 1,5	two LPG pump switching	4	16	ZŽ, Č, Č, H	CMSM 4B x 2,5
CMSM 5C x 1,5	calculator feeding PDE, ADP or ADPMPD	5	15	ZŽ, 3 x Č, SM	CMSM 5C x 2,5
CMSM 3C x 1,5	calculator feeding Puma HT-TE, Puma MPD	3	18	ZŽ, H, SM	CMSM 3C x 2,5
CMSM 4D x 1,5	communication line	4	15	SM, Č, Č, H + ST	TCEKFE 2P 1,0 Belden #88723

Notes : ZŽ - green-yellow, H - brown, Č - black, M - blue, SM - light blue, ST - shield

Table 9 Characteristic features of cables

RECOMMENDATION

The pulse overvoltage can take place in any line due to lightning - up to the distance of several kilometers - or due to industrial activities. The pulses arisen by lightning induction are quite enough for full destruction of the electronic unit. For this purpose the advanced countries usually apply the overvoltage protection, leading the overvoltage pulse power away into the earthing conductor, thus protecting the unit in question. Therefore the manufacturer of fuel dispensers recommends to protect the main (and/or the secondary) switchboard, feeding the fuel dispenser, electronic unit (computer, POS, etc.) and the data lines by overvoltage protection and lightning arresters.

RECOMMENDATION

In order to provide trouble-free operation of fuel dispensers **it is necessary** to secure the stabilized fuel dispenser feeding by the standby source - UPS. Power supply dropouts, heavy disturbances or drop of voltage in peak hours (particularly during winter season) are very frequent phenomena in our power supply network. All phenomena as above can be eliminated by utilization of a correct standby source (UPS). There are two models of standby source available and suitable for the fuel dispenser in our market:

- * UPS of line interactive type
- * UPS of on-line type

UPS of the line-interactive type is enough for stabilization in the filling stations connected to a very stable power supply network (without any voltage drop and without any disturbances).

In other cases the ON-LINE type UPS has to be applied. Disturbances, drops of voltage or failures can result in frequent blocking of the dispensers, problems in computer/dispenser communication, failures of computers (data loss), etc.

IMPORTANT

For trouble-free operation of the fuel dispensers the signal cables **have to be** separated thoroughly from the power supply cables. Parallel connection of power and signal cables without any separation results in disturbances and undesirable parasite phenomena which may cause problems with fuel dispenser control and/or even full damage of electronic units inside the dispensers and in the kiosk. Therefore any crossing or parallel laying (in a single bundle) of the signal and power cables has to be prevented reliably. Separate "channels" (metal tubes, troughs) for power and signal cables represent a suitable solution. The manufacturer is not liable for the damages caused due to unsuitably designed cable connection.

3. Basic Functions and Dispenser Setting

Setting of the LPG dispensers is done by the set of parameters, by which functional dispenser parameters can be controlled, mode and behaviour of the dispenser in different situations changed materially. Values of the parameters can be monitored and changed either by the remote IR controller or by the functional keys placed directly on the calculator or on a simple keyboard, being the integral part of the calculator assembly.

Method of setting of the fuel dispenser differs, depending on the type of the used calculator placed in the dispenser head. The section below describes basic functions and setting for the calculators PDE, Puma HT-TE, Puma MPD, ADP/M and ADPM/M.

3.1. PDE Calculator

The calculator PDE, manufactured by the company TATSUNO-BENČ EUROPE a.s., is set by the remote IR controller (marked PDERT). The setting mode serves for monitoring and change of the parameters and provides the following operations:

- displaying of non-resetable electronic volume and cash amount totalizers of all hoses
- displaying and reset of daily electronic volume and cash amount totalizers of all hoses
- setting of unit product prices (manual mode)
- setting of different functional parameters of the dispenser

The setting mode can be recalled on the dispenser by the method below only if the dispenser is at rest (completed dispensing, all nozzles are accommodated in the boots). There are two setting modes available:

- **Operator mode** (specified for filling station operators) – the operator can only read values of electronic totalizers and values of basic dispenser parameters. The operator can neither reset nor change their values.
- **Manager mode** (specified for the filling station manager) – The manager is authorized both to read the values, reset daily totalizers and to set basic operating parameters of the LPG dispenser. The manager must load the access password to be able to work in the manager mode.



Fig. 5 - Remote IR controller PDERT-30

3.1.1. Remote Fuel Dispenser Control

A special remote IR controller must be used for reading dispenser values (totalizers), change of the dispenser mode or for setting different calculator parameters on the LPG dispensers equipped by the **PDE calculator**. The Remote controller keyboard had the following keys and their layout:

key	function	key	function
OPERATING STATE		CALCULATOR PARAMETER READING	
<Shift>< Enter>	Release of dispenser side after payment or failure	<Next>	Switching to next parameter
< 0 >	Release of both sides (whole fuel dispenser) after payment or failure	<Shift> <Next>	Switching to previous parameter
< 1 >	Preset - depressing of corresponding preset key No. 3 (10 litres)	< + >	Switching to next parameter item
< 2 >	Preset - depressing of corresponding preset key No. 4 (1 litre)	<Shift> < + >	Switching to previous parameter item
< 3 >	Displaying of the latest refilling on the display	< Enter >	Changed value of the displayed parameter (if the operation is permitted)
< 4 >	Preset - depressing of corresponding preset key No.1 (CZK 100)	<0> až <9>	Direct switching to the parameter with preset number
< 5 >	Preset - depressing of corresponding preset key No.2 (CZK 10)	<REG>	End of selected mode
< 6 >	Cancel of preset on one fuel dispenser side (preset key No.5 – Cancel)	CHANGE OF PARAMETER VALUE AND LOADING OF ACCESS	
< 7 >	Lighting fuel dispenser ON	<0> až <9>	Loading of value of the edited digit and switching to the next figure
< 8 >	Displaying of converted CNG gas volume (if the function is activated))	< + >	Increase of value of just edited parameter digit
< 9 >	Lighting fuel dispenser OFF	<Shift> < + >	Decrease of value of just edited parameter digit
		<Next>	Switching to editing of the next parameter digit
START OF SETTING MODES		<Shift> <Next>	Switching to editing of the previous parameter digit
<Shift> <REG>	Commences the operator mode	< Enter >	End of change and loading of a new value
<REG>	Commences the manager mode (upon loading the password)	<Shift>< Enter>	End of change w/o loading of a new value

Table 8 - Description of the keys on the remote PDE calculator controller

3.1.2. Setting of Parameters on Dispenser with Fuel Volume Display

The process of setting is similar to that of the classic three-line display, only functions of certain keys on the remote controller keyboard differ.

Basic principles of setting in the manager and service mode:

1. The manager mode is entered by depressing the key <REG>. The word „CODE“ appears for ca 1 second on the display. Now the password must be loaded. After loading the correct password and confirmation by the key <Enter> the volume display will show „-0“ and the dispenser waits for loading the relevant parameter digit.
2. Switching between the parameters - by the keys <Next> and <Shift><Next>, between sub-parameters - by <+> and <Next> <+>
3. To display value of the parameter on the line “Litres” (fuel volume) - depress the key <1>. To display value of the parameter on the line „Price“ (cash amount) - depress the key <2>. The key <Shift> <Enter> again displays the number of the parameter (i.e. displays the line „Kč/litr“ - unit grade price)
4. Change (editing) of parameter value - by the key <Enter>
5. Mode exit - by the key <REG>

Viewing of the parameters (totalizers) in the operator mode is done in the same way. When depressing the key <Shift> <REG>, the first parameter 01 will appear automatically. Switching between the parameters - by the keys <Next> and <Shift> <Next>, between sub-parameters - by <+> and <Shift> <+>. By depressing the keys <1> and <2>, parameter values can be monitored. Operator mode exit - by depressing the key <REG>.

3.1.3. Data Monitoring in Setting Mode

All data in the setting modes are displayed on the dispenser display. When controlling by the remote controller, the data are displayed on the dispenser side, which the setting mode was recalled from (by the controller). Individual parameters are displayed as follows:

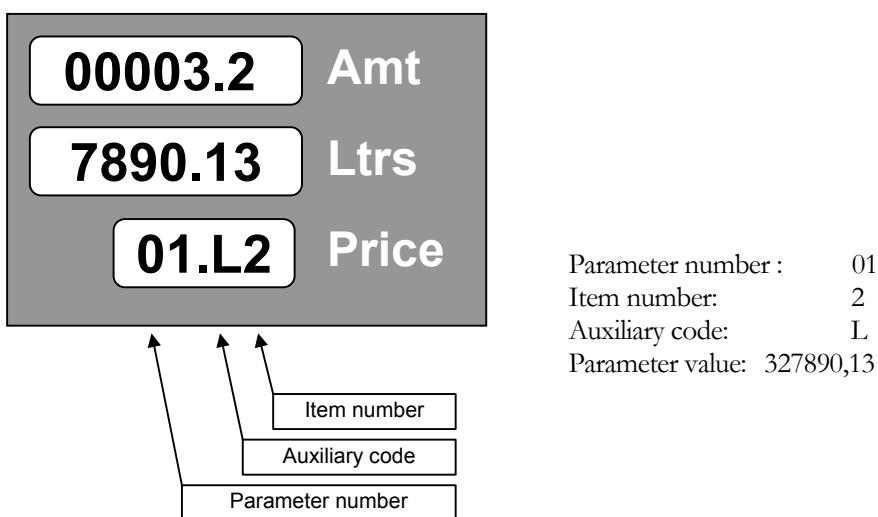


Fig. 6 - Example of parameter displaying

3.1.4. Operator Mode

The operator mode is started by pointing the dispenser display by the IR remote controller (at the distance of ca 1 m from the dispenser) and by depressing the key <Shift> and then the key <REG>. **All nozzles must be locked securely in the boot !!**

After the operator mode is recalled, value of the first parameter is displayed. Switching to the next parameters and their items is carried out using the keys <Next> and <+> (see sec. 3.1.1.).

The operator mode enables to display (**but not change !!**) the following parameters:

Param.	Description
01	Non-resetable totalizers
02	Daily totalizers
03	Unit fuel product prices
04	Current time and date
05	Version of program and CRC parameters (check total)
06	History of failures
07	History of dispensing

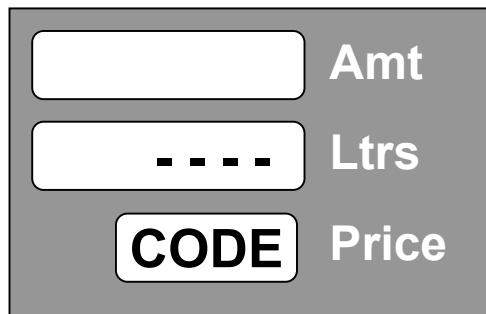
Table 9 - List of operator mode parameters

The operator mode is ended by depressing the key <REG> on the remote controller. The mode is also ended automatically, if no key is depressed for 60 seconds.

3.1.5. Manager Mode

The manager mode is started by pointing the dispenser display by the remote controller (at the distance of ca 1 m from the dispenser) and by depressing the key <REG>. **All nozzles must be locked securely in the boot !**

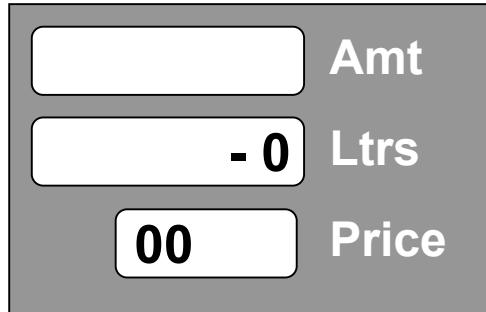
After the manager mode is recalled, the display shows the prompt for loading the 4-digit access password:



To have the password secret, the loaded digits are displayed as points. The manufacturer has set the access password : „1111“.

Example:

Depress the keys <1><1><1><1> and <Enter>



After the valid password is loaded, the display shows the parameter number 00; by depressing the key <Enter> you can continue by automatic switching to the parameter No. 01, or it is possible to load the **parameter number** and <Enter> for direct switching to the requested parameter. After the manager mode is recalled, value of the first parameter will be displayed.

The manager mode enables to display and change (set) the following parameters:

Param.	Description
01*	Non-resetable totalizers
02	Daily totalizers
03	Unit prices of the products
04	Current time and date
05*	Version of program and CRC number
06*	History of failures
07*	History of dispensing
08	Access password
09	History of maintenance
10	- unused -
11	- unused -
12	Fuel dispenser operating mode
13*	Statistics of failures
14*	Current operating temperature
15	Reset of daily totalizers
16	Operating check number
17	- unused -
18	Text messages of LCD alphanumeric display
19	Displaying of display segment error

Parameters marked by asterisk () can be viewed only in the manager mode, not set*

Table 10 - List of manager mode parameters

The manager mode is ended by depressing the key <REG> on the remote controller. The mode is also ended automatically, if no key is depressed for 60 seconds.

3.1.5.1. Non-resetable totalizers (code 01)

Electronic totalizers of all hoses (meters) are stored in electronic calculator memory. These totalizers are **non-resetable** and show how many litres were dispensed by individual hoses.

item number	description
1	volume dispensed by the hose 1 in litres
2	volume dispensed by the hose 2 in litres
...	...
9	volume dispensed by the hose 9 in litres
H	volume dispensed by the hose 10 in litres

Table 11 - Non-resetable totalizers (code 01)

3.1.5.2. Daily totalizers (code 02)

The electronic daily totalizers of all hoses (meters) are stored in electronic calculator memory. **These totalizers can be reset at any time (manager mode - parameter 15).** The daily totalizers show, what fuel volume /cash was dispensed by individual hoses since the latest resetting.

aux. code	item number	description
L	1	volume dispensed by the hose No.1 in litres
A	1	amount dispensed by the hose No.1 in currency
L	2	volume dispensed by the hose No.2 in litres
...
A	9	amount dispensed by the hose No. 9 in currency
L	H	volume dispensed by the hose No.10 in litres
A	H	amount dispensed by the hose No.10 in currency

Table 12- Daily totalizers (code 02)

3.1.5.3. Fuel Product Unit Prices (code 03)

The function enables to display and set current unit prices of all fuel products (i.e. prices per 1 litre of fuel) sold for cash.

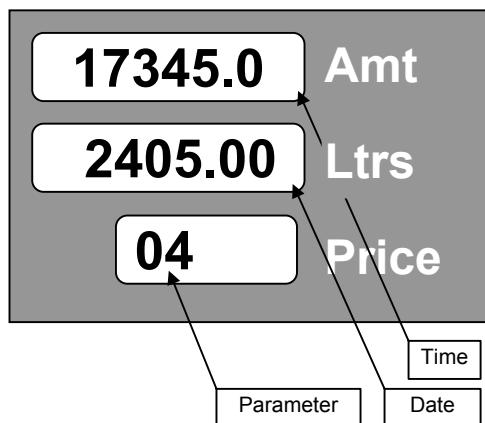
item number	description	default setting
1	unit price of product 1	00.00
2	unit price of product 2	00.00
3	unit price of product 3	00.00
4	unit price of product 4	00.00
5	unit price of product 5	00.00

Table 13 - Unit prices of individual fuel products (code 03)

If the fuel dispenser (calculator) is connected to the control system, then the price is updated after each calculator activation, namely by the product values set in the control system

3.1.5.4. Current Time and Date (code 04)

The function enables to display and set the current date and time. Setting can be done by depressing the key <Enter> and by loading date and time.



The first line displays time in the format HHMMSS (hours, minutes and seconds), the second line displays date in the format DDMMYY (day, month and year) - example 17:34:50 24.05.00

3.1.5.5. Displaying of Program Version and Check Sum (code 05)

The function displays the number of the program version of the dispenser calculator and the check sum of memory parameters.

- Line 1 (amount) – check sum
- Line 2 (litres) - version number (e.g. 3.34 - version 3.34)

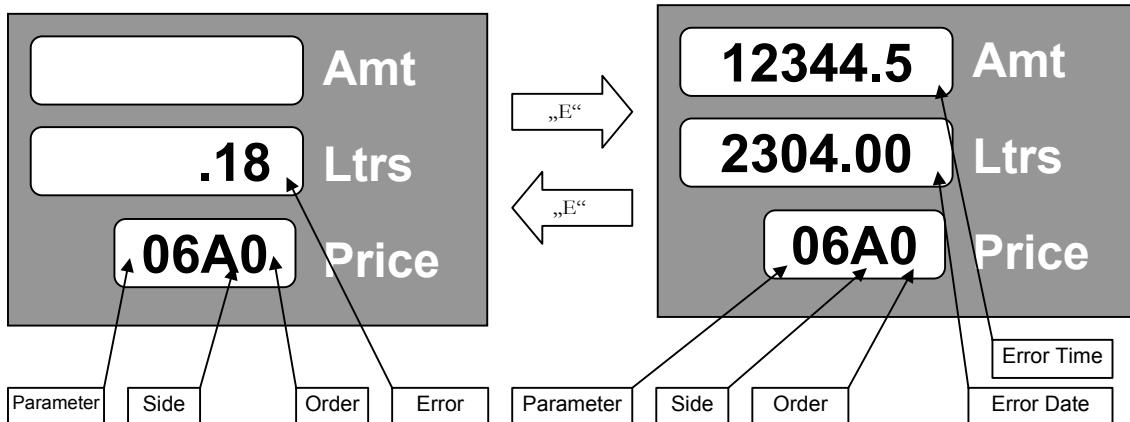
3.1.5.6. Displaying of Latest Error Conditions of Fuel Dispenser (code 06)

The function serves for displaying of the history of the latest ten error codes of faults, occurred on the dispenser.

Table of error messages can be found in the Appendix D.

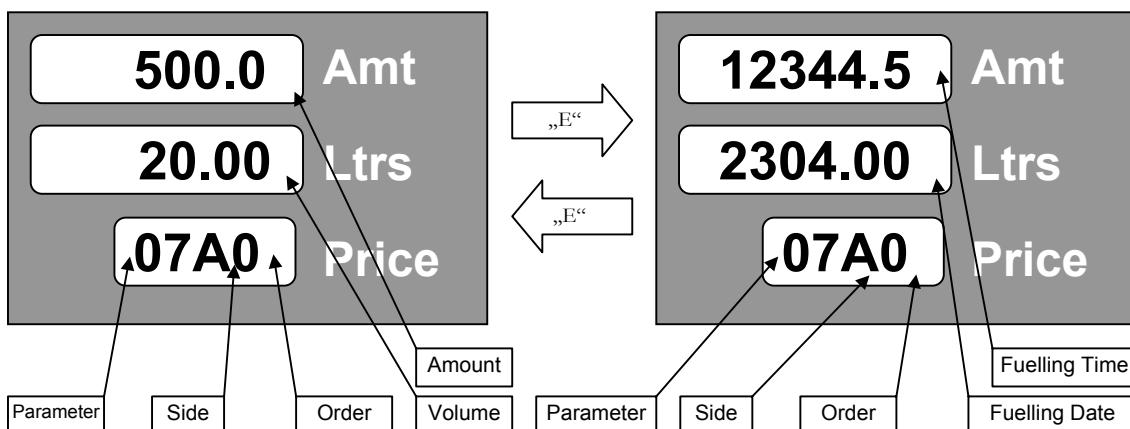
aux. code	item number	description
A	0	code of the last (tenth) error of the dispenser on display side A
B	0	code of the last (tenth) error of the dispenser on display side B
A	1	code of the last but one (ninth) error of the dispenser on side A
B	1	code of the last but one (ninth) error of the dispenser on side B
...
A	9	code of the error (first in the history) of the dispenser on side A
B	9	code of the error (first in the history) of the dispenser on side B

Table 14 - Displaying of error conditions of the fuel dispenser (code 06)



3.1.5.7. Displaying of History of Dispensing (code 07)

The function serves for displaying of the history of the latest 10 dispensing transactions (on each side) realized on the dispenser. Data layout of this parameter on the display is as follows:



aux. code	item number	description
A	0	last transaction (tenth) on side A
B	0	last transaction (tenth) on side B
A	1	last but one transaction (ninth) on side A
B	1	last but one transaction (ninth) on side A
...
A	9	transaction (first in the sequence) on side A
B	9	transaction (first in the sequence) on side B

Table 15 - Displaying of the history of dispensing (code 07)

The first and second line contain price (cash amount) and dispensed volume. The unit price of the transaction with the parameter number and the auxiliary code with the item number take turns on the third line. Number of the item means position in the history of transactions - 0 is the last (newest) transaction, 9 is the oldest stored transaction. The auxiliary code means the dispenser side A or B. If the memory stack for the history of transactions is empty (i.e. there is no transaction in the history), "error" appears on the display.

3.1.5.8. Access Password (code 08)

The function enables to display and change the access password into the manager mode.

Default setting is „1111“.

3.1.5.9. History of Maintenance (code 09)

The function enables to display codes of the last 10 service remote controllers which the calculator parameters were set by.

3.1.5.10. Operating Fuel Dispenser Mode (code 12)

The function defines the type of operating fuel dispenser mode.

parameter value	Operating fuel dispenser mode
0	Automatic mode
1	Manual with switching to the automatic mode (default)
2	Manual with switching to the automatic mode and locking
3	Manual (stand alone) mode
4	Credit (internal credit - "Chipper")

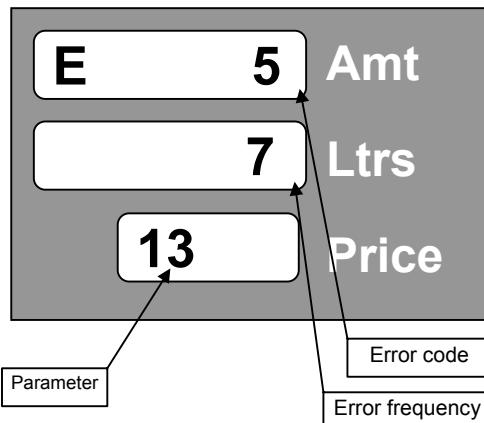
Table 16 - Operating fuel dispenser mode (code 12)

The parameter may obtain the values in the range from 0 to 4 (**the value 4 may be set for the credit version PDE only!**)

- If value of the parameter equals to **0**, the fuel dispenser is operated in the pure automatic mode i.e. it is connected to the master computer (console). The fuel dispenser is controlled by the computer fully (fuel dispenser release, locking, setting of fuel prices, etc.). Interrupted communication between the computer and the fuel dispenser is subject to the error message E 18 which appears on the display.
- If value of the parameter equals to 1, the fuel dispenser is operated in the manual mode (see the mode No. 3) until it is connected to the master computer. Then the computer is switched automatically to the automatic mode (see the mode No.1). Interrupted communication between the computer and the fuel dispenser is subject to the error message E 18 which appears on the display.
- If value of the parameter equals to **2**, the fuel dispenser is operated in the manual mode (see the mode No. 3) until it is connected to the master computer. Then the computer is switched automatically to the automatic mode (see the mode No.1). Unlike the mode 2, the fuel dispenser is locked after each transaction and has to be unlocked by the magnets or by the remote controller by depressing the key <0>. Interrupted communication between the computer and the fuel dispenser is subject to the error message E 18 which appears on the display.
- If value of the parameter equals to **3**, the fuel dispenser is operated in the pure manual mode. The fuel dispenser is independent fully (cannot be connected to the computer). Unit fuel prices may be set by the fuel dispenser parameter No. 3.
- If value of the parameter equals to **4**, the fuel dispenser is operated in the credit mode. The fuel dispenser may be switched to this mode only if the fuel dispenser is equipped by the credit module PDECRA and the switch cash/Credit is in the position "ON".

3.1.5.11. Error Statistics (code 13)

The function serves for displaying statistics of the errors which took place on the fuel dispenser since the moment of initialization or resetting of the electronic calculator. This parameter has differing data arrangement on the display:



The first and second line contain the fault code and the frequency rate of the fault in question.

3.1.5.12. Current Operating Temperature (code 14)

The function displays the current temperature measured by the temperature sensor placed on the processor board.

- line 1 (Amount) – operating calculator temperature
- line 2 (Litres) - temperature of the product 1, 2, 3 or 4 (only if the temperature sensors are installed)

3.1.5.13. Daily Totalizer Resetting (code 15)

The function serves for resetting of all daily totalizers (registers) of the dispensing hoses.

After setting the parameter value to 1 and after confirmation all totalizers will be **reset**.

3.1.5.14. Operating Check Number (code 16)

The function serves for displaying of the 6-digit operating check number and for operating code loading.

- 1 line 1 (Amount) – operating check number

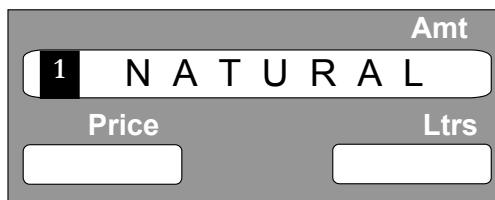
3.1.5.15. Text messages (code 18)

If the fuel dispenser is equipped by the alphanumeric display, the function enables to set the text messages which will appear on the alphanumeric display. The text messages may be divided into three groups:

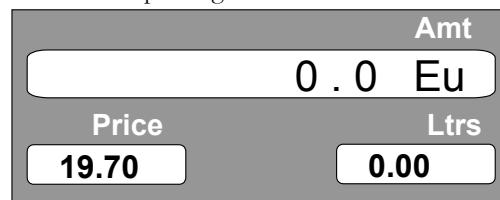
- product names
- state messages
- promotion messages

Text messages No...1 to No...5 are reserved for product names. The product name with the product number appear on the display immediately after nozzle release, prior to display resetting. 7 characters may be used for the product name. The first character is reserved for the dispensed product number. Product names may be set directly on the fuel dispenser and from the master computer (if enabled by the control system).

Nozzle release



Start of dispensing



- Text messages No.9 and No.109 are reserved for state messages. The said messages relate to the fuel dispenser state. The message No.9 (if permitted) will appear on the display immediately after completed refueling (after putting the nozzle back - before display resetting). The said message will take turns on the display with the transaction data (e.g. "Payment" – 100.00 – „Payment“ – 100.00). The message No.10 (if permitted) will appear on the display always after the fuel dispenser is locked. The said message will take turns on the display with the transaction data (e.g., „Locked“ – 100.00 – „Locked“ – 100.00

- The text messages No. **11** to **23** are devoted to the promotion messages. The messages No.**11** to **19** (if permitted) will appear on the display always after its resetting. The said messages will take turns on the display. The text message No. **20** (if permitted) - current time. Time will appear on the display always after fuel dispenser display resetting. The current time has to be set after the fuel dispenser is switched off and on (the current time setting is reset after the fuel dispenser is switched off). The text message No. **21** (if permitted) - current date. It will appear on the display always after fuel dispenser display resetting. The text messages No. **22** and **23** (if permitted) display the currency and quantity unit in case of data preset on the fuel dispenser.

parameter value	auxiliary code	description
0	-	Not display the text message
1	1,2 až 20	Display text message
2	1,2 až 20	Text message editing

Table 17 - Setting of text message displaying (code 18)

The parameter may obtain the values from 0 to 2. The manufacturer's setting can be seen in the table 19. Value of the parameter for all text messages equals to 0 for the displays other than the alphanumeric display.

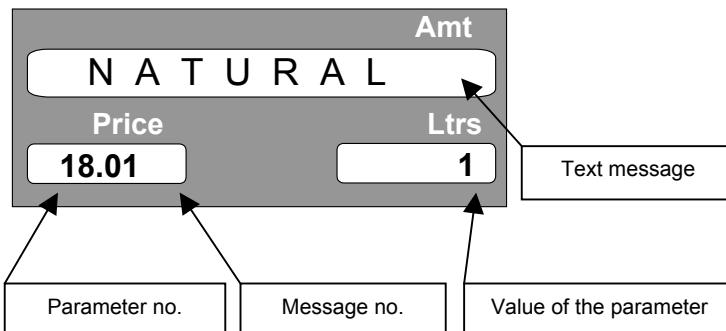
Message number	Message content	Message length (char.)	Character set			Default setting 0 - OFF 1 - ON
			Latin2 (Win 1251)	ASCII	Cyrilic (Win 1251)	
1	Product name No. 1	7	Natural	BenzBLF	АИ-95	1
2	Product name No. 2	7	Special	Benzin	А-76	1
3	Product name No. 3	7	Super	Super	АИ-96	1
4	Product name No. 4	7	Nafta	Diesel	Дизел	1
5	Product name No. 5	7	Bio	Bio	АИ-90	1
6	Reserved					
7	Reserved					
8	Reserved					
9	Text after completed dispensing	8	Zaplatit	Payment	Спасибо	0
10	Text after locking	8	Blokován	Locked	Блокир.	0
11	Text after display resetting	8	Vítáme	Welcome	Привет	0
12	Text after display resetting	8	Vás			0
13	Text after display resetting	8	na naší			0
14	Text after display resetting	8	stanici.			0
15	Text after display resetting	8				0
16	Text after display resetting	8				0
17	Text after display resetting	8				0
18	Text after display resetting	8				0
19	Text after display resetting	8				0
20	Text after resetting - time	8	00:00,00	00:00,00	00:00,00	0
21	Text after resetting - date	8	01/01/90	01/01/90	01/01/90	0
22	Text of preset for cash amount	2	Kč	\$	Ру	1
23	Text of preset for fuel volume	2	Lt	Lt	Лт	1

Table 18 - Table of plant setting of the text messages

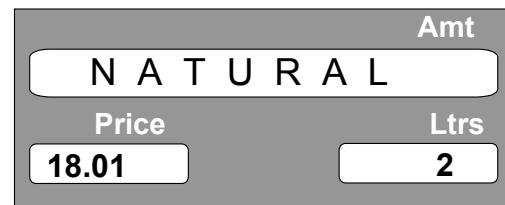
Sequence of text message editing is as follows:

- Select the parameter No.18 and then select the text message number (using the keys <+> and <Shift><+>)
- Depress enter (key <Enter>) and load value of parameter 2 - editing
- Move the cursor to the first alphanumeric character which may be edited. Now load - scrolling the characters forwards or backwards - using the keys <+> and <Shift><+>. When the selected character is displayed, depress the key <Next> to move to the next character.
- After setting of the message is completed, depress <Enter>

1) Selection of text message number



2) Selection of editing



3.1.5.16. Displaying of Display Segment Error (code 19)

The function enables/disables displaying of the display segment error (E1) by the processor.

Parameter value	Description
0	Do not display the error of the display segment
1	Display the error of the display segment - <i>default setting</i>

Table 19 - Displaying of the display segment fault/error (code 19)

3.2. Calculators Puma HT-TE and Puma MPD

The calculators Puma HT-TE and Puma MPD produced by the company Gilbarco Veederoot S.p.A. (the former company Logitron) are set by the three-key keyboard.



Fig. 7 - Keyboard of the calculators Puma HT-TE and Puma MPD

Functions of the keys are as follows:

Key	Function
<>	Entry into the price setting mode (after calculator switching) Selection of figures on the unit price display
<+>	Value increase

Price setting (for manual mode)

Unit price setting is done in the manual mode namely as follows:

- switching the calculator ON/OFF
- display mask removal
- depressing the key <-> (the calculator is switched to the price setting mode)
- selection of the figure for the price, the value of which is to be changed by the key <->
- setting of the value of the selected figure by the key <+>
- display mask mounting
- switching the calculator ON/OFF

Setting or monitoring of parameters

This operation is reserved to service technicians (servicemen) only !!!

3.3. Calculators ADP/M and ADPMPD/M

The calculators ADP and ADPMPD produced by the company Beta Control s.r.o. are set, using the IR manager keyboard KL-MANINF provided with four keys <R>, <0>, <+> and <->.

Functions of the keys are as follows:

Key	Function
<0>	Entry into the price setting mode (after calculator switching)
<->	Selection of figures on the unit price display. Selection of the product (grade) for pricing
<+>	Value increase. Entry into the mode of totalizer reading (fuel dispenser at rest)

Price setting (for manual mode)

Necessary conditions for switching to unit price setting:

- operating mode MAN (parameter No. 51 equals to the value 1),
- the nozzle has not been released since the last actuation of the calculator,
- the completed transactions have to be confirmed (release through RLS inlets, if the parameter No. 4 equals to 1).

In the MAN mode the unit product prices are set , using the manager keyboard KL-MANINF or the service keyboard KL-SERINF.



Fig. 2 - Setting of unit prices for the calculator ADP/M

a) Mode of unit price setting

b) Switching from the highest unit product price order, side A

c) Switching to the lowest unit product price order, side B

Fig. 8 - Manager keyboard
KL-MANINF

- 1) The user can switch the mode of unit price setting by depressing the key „0“.
- 2) In the mode of unit price setting - see Fig. 13a)
 - on the first display line (i.e. the line of the total price) the number of the side, which the unit price is set for, will be displayed („1“...page A, „2“... page B),
 - on the second display line (i.e. on the line of the total volume), the number of the nozzle which the unit price is set for, will be displayed (i.e. for ADP2/M always the nozzle No. 1),
 - on the third display line (i.e. on the unit price line) the number representing the value to be set by the user will blink..
- 3) User
 - using the key „+“, increases the value of the currently set (i.e. blinking) digit (the value 9 is changed to 0), by depressing the key „+“ the user can scroll through the values 0–9, i.e. the auto repeat function,
 - using the key „-“, shifts setting towards higher figure orders,
 - from the highest order of the unit product price, see the Fig. 13b), using the key „-“, shifts setting to the lowest order of the unit product price of another side, see Fig. 13c)
- 4) This way the user can set the price for the side A and then for the side B (if any, and its product has a different price - see the parameters No. 46).
- 5) The user can end setting of unit price values at any time by depressing the key „0“.
- 6) The set unit prices are written into the non-volatile memory and the calculator returns to the MAN mode.

Displaying of electronic totalizers

Displaying of the electronic totalizer is carried out as follows:

- the fuel dispenser is at rest, all transactions are transferred to the POS and all nozzles are suspended in the boot
- by directing the IR keyboard onto the fuel dispenser display and by depressing the key <+>, the volume (litre) totalizer of the first nozzle will appear - e.g. "U0000012345.90"
- by depressing the key <+>, the sum totalizer of the first nozzle will appear - e.g. "A00000235678.9"
- by depressing the key <+>, volume and price totalizers for other nozzles will appear
- totalizer reading is ended by depressing the key <0>

Setting or monitoring of parameters

This operation is reserved to service technicians (servicemen) only !!!

4. Operation

4.1. Instructions for Safe Operation

The LPG dispenser is a complex device which must fulfill a number of demanding functions. Prior to putting the fuel dispenser into operation, the following operations have to be carried out:

- a) pressure testing of the fuel dispenser together with pipe systems by the pressure of 2.5 MPa incl. inspection
- b) inspection of el. power distribution and check for correct wiring have to be carried out to prevent electric shock and to provide flameproofness.



Fig. 3 - No smoking



Fig. 4 - No open fire



Fig. 5 - No mobile phone

CAUTION

- Technical and technological equipment must comply with the approved conditions which comprise the instructions for safe operation and maintenance as well as solution of emergency states. Snow fire extinguishers must be available close to the device in conformity with the fire safety rules.
- Only the persons that have provably passed the training may operate the LPG pumping station.
- The fuel dispenser is equipped by the "STOP button" (for emergency situations); the procedure in case of fire or emergency situation is determined precisely by the local bylaws - the operator must be trained correspondingly.
- The "STOP line" must be placed 5 m from the fuel dispenser as a minimum.
- LPG storage tanks, pipelines and the dispenser must be earthed, the earthing point for the road tanker must be marked explicitly.
- When refueling, re-pumping and emptying LPG, the issued regulations have to be adhered to, arrival and operation in the specified pumping station premises prevented according to the local conditions.
- When selling and pumping LPG, the determined procedure has to be adhered to; in case of any danger the device must be put out of operation immediately. When refueling, the operator of the pumping station must be present; refueling is prohibited during storms (danger of atmospheric discharges).
- It is necessary to keep the preset deadlines for regular inspections and checks of the complete installed unit; intervention of the persons without relevant competence, capability and qualification into the installed technology, incl. the gas appliance, must be prevented safely.
- The operator may not carry out any repairs of the devices and change setting of the safety fittings. Regular maintenance and service may be carried out by the authorized service company only.
- The operator shall keep the device in intact and safe state; any defect or unusual phenomenon shall be notified to the service organization immediately; in case of danger of delayed intervention the device must be put out of operation.

CAUTION

- Smoking and open fire handling is prohibited in the vicinity of the dispenser.
- Smoking is prohibited also for the persons sitting in the car.
- It is prohibited to use the mobile phone in the vicinity of the dispenser.
- It is prohibited to dispense if the motor is running.

4.2. Putting LPG Dispenser into Operation

Switching the fuel dispenser ON/OFF is carried out in the master switchboard of the filling station, where fuel dispenser feeders are connected. Each fuel dispenser has three power supply outlets in the master switchboard:

- feeding of electronic calculator (230V stabilized)
- feeding of valve switching (230V non-stabilized)

All points above are protected by relevant circuit breakers, by which the fuel dispensers are switched ON/OFF. LPG dispensers with calculators Puma HT-TE and Puma MPD have only the outlet for electronic calculator feeding (230V stabilized) in the main switchboard.

RECOMMENDATION

Switching the fuel dispenser ON shall be done as follows:

- 1) Switching ON the standby source (UPS) in the kiosk (the green pilot lamp of the UPS goes on)
- 2) Switching ON the 230 V circuit breaker for stabilized feeding of the electronic fuel dispenser calculator (all display segments are tested automatically and values of the last operation of dispensing will be displayed)
- 3) Switching ON the 230 V circuit breaker for non-stabilized feeding of valves and switching of LPG pumps

Now the LPG dispenser is ready for dispensing/refueling.

4.3. Operation of LPG Fuel Dispenser

Prior to start refueling, the fuel dispenser operator shall check whether the tank has the homologation mark and whether the motor and el. equipment of the vehicle are switched off. The operator also inspects state and/or wear of the filler which might cause gas leaks. If serious defects are revealed, the operator may reject tank refueling. In case of gas leaks or any danger the operator stops refueling.

4.3.1. Vehicle Refueling by LPG

Operation of the fuel dispenser itself is provided by the filling station staff who releases the nozzle from the fuel dispenser and connects it with the fuel tank of the vehicle which must be braked reliably. When depressing the control button on the calculator box, the el. calculator is reset and the pump el. motor placed next to the standby fuel reservoir started. Refueling can be stopped at any time by releasing the control button. When filling the "full" tank, the filling tank neck is closed as soon as 80% of the tank volume is refueled and the safety controller (el. calculator) interrupts refueling after 10 seconds, irrespectively of the control button. The data remain displayed on the calculator.

The fuel dispensers equipped by electronic pre-selection enable to preset precise requested amount, determined by volume or by price. These fuel dispensers are equipped by the double-stage electromagnetic valve.

DUTIES OF LPG FUEL DISPENSER OPERATOR

- Adhere to the bylaws and operation manuals of gas appliances.
- Maintain the operated device in safe and workable state.
- Notify any fault, defect, unusual phenomena revealed during operation to the filling station owner immediately.
- Put the device out of operation in case of gas leak or another danger.
- Keep the device in order and clean and prevent unauthorized persons from access.
- Notify the events, making the operator's work problematic/difficult, to the owner.
- Record the data concerning start and end of every shift, inspections, repairs and reviews duly into the operating log book.

- Operator of the fuel dispenser and fuel tank may neither carry out any repairs by himself nor change setting of the equipment or safety fittings.

OPERATOR'S OUTFIT

- soap (foamy) solution + brush for detection of leaks
- leather gloves
- the first-aid-kit, log book, writing utensils, operating and safety rules, wiring diagram of the fittings and fire extinguisher must be available in the filling station kiosk

4.3.2. Safety of LPG Fuel Dispenser Operation

Owner of the filling station is liable for its operation which shall be entrusted to the trained staff only, having relevant authorization. The operator refuels vehicle tanks by LPG professionally, checks state of the fuel dispenser and the technology in the preset time intervals, checks operation of the whole unit and maintains operating records. The prohibit of smoking and open fire handing in the area of 10 m must be fixed on a visible places next to the fuel dispenser. The notice of necessary motor switch-off, max. volume of refueling (80%) and braking the vehicle from undesirable motion has also be placed here. From the design point of view the fuel dispensers and all components which might initiate explosion are approved by the state authorized institution - the State Testing Laboratory No. 210 FTZÚ Ostrava-Radvanice, which issues the necessary certificates. Environmental safety is supported by ČIŽP Certificate No. 90/00/895/01/TOM.

For detection of possible gas leaks relevant detectors/sensors can be installed in the fuel dispenser area - the sensors are out of scope of the basic offer. From the hygienic point of view the device is harmless for the operator and the owner. When operating and maintaining the device, it is advisable to protect the hands by gloves.

FIRST AID

Poisoning-gaseous LPG

When refueling, avoid LPG vapor inhalation - danger of suffocation. The injured person must be taken out of the contaminated area. Attention! Fire and explosion hazard! LPG is not poisonous, but is suffocating. In case of breathing failure carry out apply artificial breathing immediately. In case of blood circulation failure combine artificial breathing with indirect heart massage. Transfer the affected person the health facility immediately.

Frostbites-liquid LPG

In case of steep drop of overpressure to the atmospheric pressure the liquid LPG is evaporated under the temperature of -42°C. Leak of the liquid LPG may result in frostbites, when in contact with the skin. Do not rub the frostbitten parts of the body, but cover by a sterile dressing and call the doctor.

Eyes affected by LPG shall be flushed by plenty of water. Call the doctor.

Burns-fire

When burnt, cool the injury by cold water, do not lubricate, cover by a sterile dressing and call the doctor. Do not remove the dress. If the clothes are burnt - do not run, extinguish by water, blanket, by rolling about

4.3.3. Pre-selection Keyboard

The LPG dispensers TATSUNO BENČ can be completed by the pre-selection (preset) keyboard for presetting of the sum or volume directly on the fuel dispenser by the customer himself. Prior to start refueling, the customer can decide how much fuel or for what price he wants to refuel himself.

NOTE

If the pre-selection keyboards are installed, the fuel dispensers have to be equipped by pre-selection deceleration valves.

Example of Presetting in CZK

- 1) The customer comes to the fuel dispenser and wishes to refuel himself for CZK.

- 2) The fuel dispenser operator releases the nozzle from the dispenser and connects it with the vehicle tank. Loads the value 250 (depresses the key <100 CZK> twice and the key <10 CZK> five times) on the pre-selection keyboard, using the numerical keys.
- 3) The operator depresses the control button on the calculator box. The el. calculator will be reset and the pump el. motor placed next to the standby reservoir started.
- 4) The fuel dispenser dispenses precisely the preset sum and stops automatically afterwards.

Example of Presetting in Litres

- 1) The customer comes to the fuel dispenser and wishes to refuel himself by 28 liters of fuel.
- 2) The fuel dispenser operator releases the nozzle from the dispenser and connects it with the vehicle tank. Loads the value 28 (depresses the key <10 litres> twice and the key <1 litre> eight times) on the pre-selection keyboard, using the numerical keys.
- 3) The operator depresses the control button on the calculator box. The el. calculator will be reset and the pump el. motor placed next to the standby reservoir started.
- 4) The fuel dispenser dispenses precisely the preset volume and stops automatically afterwards.

Note: Refueling to the pre-selected value can be cancelled by depressing the key <Zrusť> (Cancel) prior to start refueling. Then another value can be pre-selected or the standard refueling may be applied (without applying the pre-selection).

4.3.4. Electromechanical Litre Totalizers

The fuel dispensers TATSUNO-BENČ are equipped by electromechanical totalizers (as the standard) for monitoring of the total fuel volume dispensed by each hose. The totalizers are placed on the LPG dispenser display. One 7-digit totalizer, showing the number of full litres pumped by the relevant hose, corresponds to each dispensing hose.

4.3.5. Fuel Dispenser Display Back-lighting

Displays of all fuel dispensers are back-lighted by SMD LED diodes. In case of the PDE calculator intensity of back-lighting is controlled as follows: the maximum intensity during dispensing and reduced to one third if the data on the display are not changed (automatic switching after expiration of 30 seconds).

4.3.6. Signaling Diode SIG on the Display

The signaling diode signaling the state of payment, blocking and fault of the fuel dispenser (red). The signaling diode **SIG** is switched to **continuous red light**, if the fuel dispenser waits for paying or is in the blocked state and is switched to the **blinking red light** if the fuel dispenser is faulty.

4.3.7. Signaling Diode PWR on the Display

The orange signaling diode **PWR** serves for signaling of dispenser calculator feeding. If the diode is ON, the dispenser calculator is actuated.

4.4. End of LPG Fuel Dispenser Operation**RECOMMENDATION**

Switching the fuel dispenser off should be carried out as follows:

- 1) Switch OFF 230V circuit breakers for non-stabilized feeding of valves and switching of LPG pump
- 2) Switch OFF 230V circuit breakers for stabilized feeding of electronic fuel dispenser calculator
- 3) Switch OFF the UPS source placed in the kiosk by the switch button on the real panel (the green pilot lamp on the UPS source goes off)

5. Maintenance and Service

CAUTION

Prior to start any maintenance intervention into mechanical, hydraulic or electric parts / assemblies, it is always necessary to disconnect the fuel dispenser from the power supply source and to protect it from re-connection reliably.

CAUTION

DO NOT OPEN THE JUNCTION BOX COVER IF THE FUEL DISPENSER IS ENERGIZED !

CAUTION

Each handling and dismantling operation of the parts and assemblies above (even filter cover opening) is conditioned by forcing the medium out of the fuel dispenser hydraulic system, using nitrogen or inert gas!

Electric and electronic parts/assemblies may be serviced only and exclusively by the specialist liable for safety of the device. After completed intervention the conductors must be reinstated. Correct conductor installation must prevent any contact with the moving parts of the winding module.

Caution! After each service intervention tightness of hydraulic assemblies has to be inspected; possible medium leaks have to be removed.

5.1. Survey of main principles of LPG fuel dispenser maintenance:

- maintain all fuel dispenser assemblies clean so that possible unforeseeable fault can be identified easily and removed quickly
- check condition of the nozzle and decide its repair or replacement, depending on revealed defect
- check door locks and nozzle accommodation boot for correct functioning
- maintain the fuel dispenser clean, pay attention particularly to cleanliness of calculator glass
- lubricate the nozzle by silicone oil twice a week

Maintenance of fuel dispenser "body":

Parts of the fuel dispenser body, lacquered or made of stainless steel need regular maintenance. A great attention shall be paid to these parts particularly in winter season, because aerosols of chloride preparations arisen from the salts used for road maintenance can result in permanent damage of lacquers of untreated body parts and/or to intercrystalline corrosion - guards made of stainless steel. Regular maintenance of fuel dispenser body is carried out by water and/or by solution of detergents and available car cosmetic preparations.

Owner of the fuel dispenser shall:

- Appoint one staff member liable for operation and workability of the fuel dispenser.
- Provide inspections, testing, repairs and maintenance by the professional method.
- File documents and operating records.
- Any and all activities connected with operation and service of the LPG fuel dispenser may be carried out only and exclusively by the staff with relevant authorization.

5.2. Principles of LPG Fuel Dispenser Checking

Check of equipment, tanks, pipe distribution lines and fuel dispensers are carried out with the periodicity, fixed by the bylaws of the filling station in accordance with the valid regulations.

- Check the fuel dispenser hydraulic system for tightness (by soap solution).
- Check of machinery (equipment).
- Check of non-return and safety valve for correct functioning
- Inspection, calibration and official verification of the LPG fuel dispenser is carried out by the Czech Institute of Metrology pursuant to valid regulations (by the relevant institute abroad). Periodicity of measuring device calibration is determined by the Act No. 505/1990 Coll.
- The inspection is preceded by cleaning of the whole device, clearing the tanks of dust, water and other impurities.

5.3. Fuel Dispenser Error Messages

Defect of the fuel dispenser leads to locking of the operation of refueling and to displaying of the error message on the fuel dispenser display. Nearly all error messages may be cleared by nozzle release and back suspension, by switching the electronic unit feeder ON/OFF and/or by depressing "0" on the remote controller (only the PDE electronic unit).

5.4. LPG Fuel Dispenser Service

- service operations are carried out in conformity with the operation rules of the filling station
- prior to start the works, the fuel dispenser must be put out of operation; the fuel dispenser must be affixed by a visible label "OUT OF OPERATION" and the approach lane must be marked by the sign "NO ENTRY"
- the fuel dispenser must be disconnected from the power source (switching OFF the master switch in the switchboard)
- propane-butane must be forced out of the whole system, incl. the fuel dispenser (except for the tank) by nitrogen, prior to start any works
- valves on the supply and return piping must be closed fully
- traffic of the vehicles must be prevented at the distance of 5 m round the fuel dispenser in the course of service activities
- fire extinguisher must be available for the staff
- the service intervention must be carried out by the trained staff of the service company

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5.5. Warranty and Complaints

The contractual warranty is determined - the manufacturer warrants for the supplied unit for 2 years or 1 million liters of dispensed medium as a standard. The warranty does not cover the consumables (e.g. the tubular discharge lamps). When raising possible claims, the following data have to be specified:

- Serial number and name - see the rating plate
- Precise description of fault and the circumstances under which the fault occurred.

The claim will not be acknowledged provided that damaged seals or non-permitted intervention into the unit were established. Defects and drawbacks following from incorrect operation, inspection and maintenance of the fuel dispenser or its functional assemblies are out of scope of the warranty (e.g. the problems caused by presence of water and impurities in the tank and the hydraulic system). Check for presence of water and impurities and possible cleaning is necessary in the course of operation.

5.6. Accessories

- Installation and User Manual
- Certificate of Quality and Completeness
- Certificate of Conformity
- Pressure Test Report
- IR controller for operation and programming of the calculator - for the fuel dispensers equipped by the BG PDE el. calculator
- Foundation frame (a special order)

Spare Part Catalogue

This document is specified and distributed for service organization and for servicemen.

NOTES:

Appendix A – Technical parameters

Pumped medium		liquid propane-butane (LPG)
Maximum flow rate	Q_{\max}	50 dm ³ .min ⁻¹
Minimum flow rate	Q_{\min}	5 dm ³ .min ⁻¹
Minimum refueling	V_{\min}	5 dm ³ .min ⁻¹
Cyclic volume	V_c	0,5 dm ³
Operating pressure	p	1,6 Mpa
Max. operating pressure	p_{\max}	1,8 MPa
Rated pressure	p_N	2,5 MPa
Test pressure	p_z	4,0 Mpa
Accuracy of dispensing		± 1%
Operating temperature of the ambient air		- 30 ÷ +50 °C
Operating temperature of the medium		- 20 ÷ +50 °C
ID of the piping	inlet piping	DN 19
	return piping	DN 16
Type of electronic calculator		PDE (TBE – CR) as a standard
		Puma HT-TE (Gilbarco – Veederoot)
		Puma MPD (Gilbarco – Veederoot)
		ADP/M (BetaControl – CR)
		ADPM/M (BetaControl – CR)
Display	volume	0000.00 to 9999.99 dm ³
	amount	000000 to 999999 currency units
	unit price	0000 to 9999 currency units/dm ³
Electronic calculator feeding	PDE	230V, +10% -15%, 50Hz
	Puma HT-TE or Puma MPD	230V, +10% -15%, 50Hz
	ADP/M or ADPM/M	230V, ±15%, 50Hz
Power input (consumption) of electronic calculators		84VA (max. consumption at 230V)
Electromagnetic valves supply voltage	two-stage valves	230VAC, 50Hz, 0.124A (24VAC for Puma HT-TE, MPD)
	proportional valves	+24VDC
Operating temperature (fuel dispenser with the calculator):	PDE	-40°C ÷ +70°C (tested at -50°C)
	Puma HT-TE	-25°C ÷ +55°C
	Puma MPD	-25°C ÷ +55°C
	ADPM/M	-40°C ÷ +70°C
	ADP/M	-40°C ÷ +70°C
Operating air humidity		5 ÷ 95 %

Appendix B – Dispenser Type Models

B.1. Dispenser marking

Dispensers series **BMP500.S/LPG** are marked as follow:

BMP5xy.Sz/LPG, where

- x....is the number (1 or 2) of hydraulic units installed inside dispenser
- y.... is the number (1 or 2) of total quantity of the dispensing nozzles or dispensing hoses
- z....is one of the characters D, R or L that determinates the dispenser orientation on the station in the car arrival direction:
 - D - double-sided,
 - R - right-sided
 - L - left-sided

Dispensers series **BMP2000.S/LPG** are marked as follow:

BMP20xy.Ssz/LPG, where

- x....is the number (1 or 2) of hydraulic units installed inside dispenser
- y.... is the number (1 or 8) of total quantity of the dispensing nozzles or dispensing hoses
- s... one of the characters S or M, that describe type variation of the dispenser:
 - S - "small" variation of dispenser SHARK with height 1600 mm ,
 - M - "medium" variation of dispenser SHARK with height 1900 mm,
- z....one of the characters D, R and L that determinates the dispenser orientation on the station in the car arrival direction:
 - D - double-sided,
 - R - right-sided
 - L - left-sided

B.2. Addendums

After basic type is possible to use following addendums:

/D0	LPG dispenser with volume display only
-PV	Dispensing hose rising from front cover
-ZV1	Dispensing hose rising from back cover (hydraulics), nozzle is placed on back cover
-ZV2	Dispensing hose rising from back cover (hydraulics), nozzle is placed on the side of dispenser
/CHIPPER	Builded credit automat CHIPPER
/ADP	Used counter type ADP/M from company BetaControl s.r.o. with protocol Easy Call
/ADPMPD	Used counter type ADPMPD/M from company BetaControl s.r.o. with protocol Easy Call
/ADP-LON	Used counter type ADP/M from company BetaControl s.r.o. with protocol IFSF-LON
/ADPMPD-LON	Used counter type ADPMPD/M from company BetaControl s.r.o. with protocol IFSF-LON
/HT TE	Used counter Puma HT-TE from company Gilbarco with protocol Logitron
/PUMA MPD	Used counter Puma MPD from company Gilbarco with protocol Logitron
/PUMA MPD-LON	Used counter Puma MPD from company Gilbarco with protocol IFSF-LON

B.3. Series BMP500.S/LPG

Type of dispenser	Number of pump sites	Number of hydraulics	Number of hoses	Number of displays	Pumping output [ltrs/min]	Old marking (previous models)
BMP511.SL/LPG	1	1	1	1	35 ÷ 50	BMP511 /L/LPG
BMP511.SR/LPG	1	1	1	1	35 ÷ 50	BMP511 /P/LPG
BMP511.SD/LPG	1	1	1	2	35 ÷ 50	BMP513 /LPG
BMP522.SD /LPG	2	2	2	2	35 ÷ 50	-

Note: Dispensers series BMP500.S/LPG with addendum /D0 are determinated for non-public station. These dispensers are equipped with volume displays only.

B.4. Series BMP2000.SS/LPG - variety 1600mm

Type of dispenser	Number of pump sites	Number of hydraulics	Number of hoses	Number of displays	Pumping output [ltrs/min]	Old marking (previous models)
BMP2011.SSL /LPG-PV	1	1	1	1	35 ÷ 50	BMP2011 /E /L/LPG
BMP2011.SSR/LPG-PV	1	1	1	1	35 ÷ 50	BMP2011 /E /P/LPG
BMP2022.SSD /LPG-PV	2	2	2	2	35 ÷ 50	BMP2012 /E/LPG

B.5. Series BMP2000.SM/LPG - variety 1900mm

Type of dispenser	Number of pump sites	Number of hydraulics	Number of hoses	Number of displays	Pumping output [ltrs/min]	Old marking (previous models)
BMP2011.SML /LPG-ZV1	1	1	1	1	35 ÷ 50	BMP2011 /E /L/LPG
BMP2011.SMR /LPG-ZV1	1	1	1	1	35 ÷ 50	BMP2011 /E /P/LPG
BMP2011.SMD /LPG-ZV1	1	1	1	2	35 ÷ 50	-
BMP2011.SML /LPG-ZV2	1	1	1	1	35 ÷ 50	BMP2011 /E /L/LPG
BMP2011.SMR /LPG-ZV2	1	1	1	1	35 ÷ 50	BMP2011 /E /P/LPG
BMP2022.SMD /LPG-ZV2	2	2	2	2	35 ÷ 50	-

Appendix C – Dimensions & Weights

C.1. Series BMP500.S/LPG

Type of Dispenser	Height [mm]	Width [mm]	Length [mm]	Weight [kg]
BMP511.SL /LPG	1400	525	600	100
BMP511.SR /LPG				101
BMP511.SD /LPG				190
BMP522.SD /LPG			1200	

C.2. Series BMP2000.SS/LPG - variety 1600mm

Type of Dispenser	Height [mm]	Width [mm]	Length [mm]	Weight [kg]
BMP2011.SSL /LPG-PV	1917 (1600)	520	850	145
BMP2011.SSR /LPG-PV				152
BMP2022.SSD /LPG-PV				

C.3. Series BMP2000.SM/LPG - variety 1900mm

Type of Dispenser	Height [mm]	Width [mm]	Length [mm]	Weight [kg]
BMP2011.SML /LPG-ZV1	2217 (1900)	520	850	155
BMP2011.SMR /LPG-ZV1				162
BMP2022.SMD /LPG-ZV1				155
BMP2011.SML /LPG-ZV2				162
BMP2011.SMR /LPG-ZV2				
BMP2022.SMD /LPG-ZV2				

Appendix D – Error messages

D.1. PDE calculator error messages

Code	Description
StoP	Maximum time without fuelling exceeded (60 sec.)
P1	Fuelling on pump 1 is locked by user (credit unit)
P2	Fuelling on pump 2 is locked by user (credit unit)
P3	Fuelling on pump 3 is locked by user (credit unit)
P4	Fuelling on pump 4 is locked by user (credit unit)
E 1	Display error
E 2	Display error
E 5	Display error
E 6	Electromechanical totalizer error
E 7	Memory error
E 8	Memory error
E 9	Processor error
E 10	Temperature sensor error
E 11	Data Error
E 12	Memory error
E 13	EPROM CRC error
E 15	Maximum time of fuelling exceeded
E 16	Error of Communication with unit PDEC
E 17	Communication error with POS
E 18	Communication error with POS
E 19	Low voltage (< 180V)
E 20	Interruption of the fuelling due to power off
E 21	Preselected amount/volume is zero
E 22	Data initialization
E 23	Memory error
E 24	Memory error
E 25	Electronic totalizer error
E 26	TOTAL STOP button
E 29	Invalid manager password

Code	Description
E30	Product unit price is zero
E31	Pulse channel error (pulser 1A)
E32	Pulse channel error (pulser 2A)
E33	Pulse channel error (pulser 3A)
E34	Pulse channel error (pulser 4A)
E36	Pulse channel error (pulser 1B)
E37	Pulse channel error (pulser 2B)
E38	Pulse channel error (pulser 3B)
E39	Pulse channel error (pulser 4B)
E41	Pulser power error (pulser1A)
E42	Pulser power error (pulser2A)
E43	Pulser power error (pulser3A)
E44	Pulser power error (pulser4A)
E46	Pulser power error (pulser1B)
E47	Pulser power error (pulser2B)
E48	Pulser power error (pulser3B)
E49	Pulser power error (pulser4B)
E51	Preselection exceeded , slow down valve error (1A)
E52	Preselection exceeded , slow down valve error (2A)
E53	Preselection exceeded , slow down valve error (3A)
E54	Preselection exceeded , slow down valve error (4A)
E56	Preselection exceeded , slow down valve error (1B)
E57	Preselection exceeded , slow down valve error (2B)
E58	Preselection exceeded , slow down valve error (3B)
E59	Preselection exceeded , slow down valve error (4B)

D.2. Error messages of the calculators ADP & ADPMED

Code	Description
F010	POS communication error
F020	STOP from POS
F021	pulse channel error
F023	pulse channel missing
F024	pulse channel - short circuit
F025	maximum time for fuelling exceeded
F026	maximum time without pulse exceeded
E027	max time for POS preselection exceeded
E028	max time for keyb. preselection exceeded
E029	maximum fuelled volume exceeded
F030	unit price is zero
F031	undefined product
F032	preselected value is zero
F040	power off
F041	max. totalizer frequency exceeded
F042	EEPROM write error
F043	EEPROM CRC error
F044	EEPROM data error
F045	Data version error
F047	non-correct function after power on
F049	non-correct function after power on
F050	parameters CRC error
F051	unit price CRC error

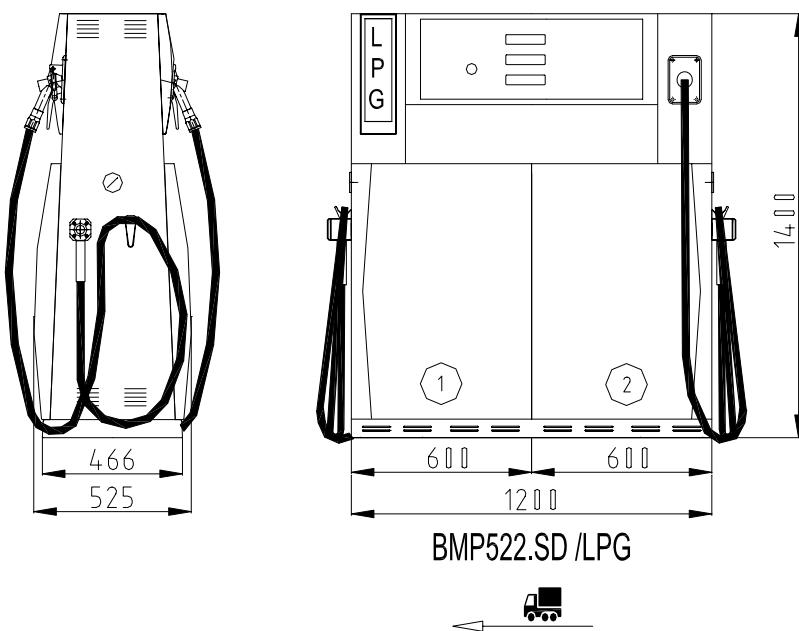
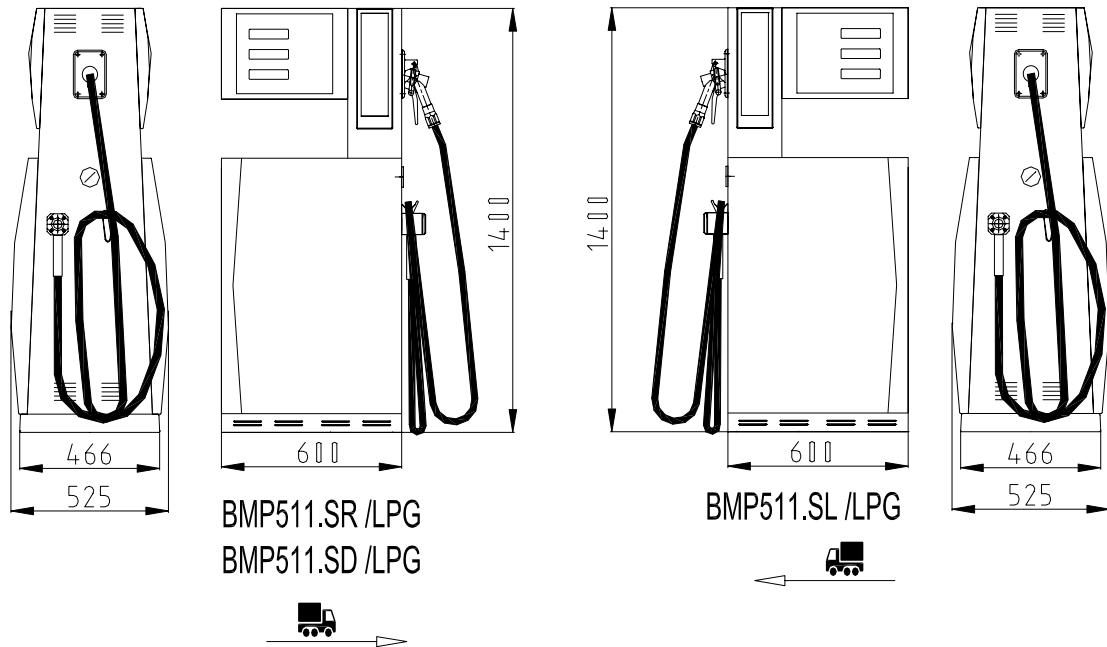
Code	Description
F052	CRC error - 9,10,20,21,22,23
F053	parameters CRC error
F054	parameters CRC error ADP2
F055	internal data error
F056	calibration data error
F057	EEPROM calibration data error
F058	temperature calibration data error
F059	vapour recovery data error
F060	vapour recovery data CRC error
F061	Missing ATC data in EEPROM
F063	CRC error EEPROM for PINs
F064	PIN attempts exceeded
F065	unit price PIN attempts exceeded
F066	main display A error
F067	slave display A error
F068	main display B error
F069	slave display B error
F070	CRC error of main display A
F072	CRC error of main display B
F097	display data structure error
F098	CRC data display error
F099	display communication error

D.3. Error messages of the calculators Puma HT-TE & MPD

Code	Device	Description
FATAL ERRORS – P		
P10	RAM	RAM error during test
P14	Parameters	Parameters CRC is valid
P25	EEPROM	Data saved in EEPROM are lost
P16	EEPROM	EEPROM failure
P22	Totalizers	Maximum totalizator frequency is exceeded
P30	CPU	Processor error
P33	EEPROM	EEPROM data saving error
P35	Pulse generator	Maximum pulse frequency exceeded
P40	Power supply	Power off
P41	Unit price	Unit price is zero
P42	Pulse generator	Pulse generator power supply error
P43	Minimum tank level	Fuel tank product level is low
NONFATAL ERRORS – E		
E70	Display	Display error
E71	Pulse generator	Pulse channel error
E72	Pulse generator	Pulse channel - short circuit - error
E73	Pulse generator	Pulse non-correct direction revolution error
E77	Hydraulic system	Hydraulic system leakage error
P20	Communication	Communication error - missing connection with POS
P80	Communication	Communication error - non correct polling

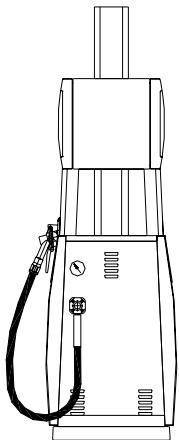
Appendix E – Figures of LPG Dispensers

E.1. LPG dispensers series BMP500.S/LPG

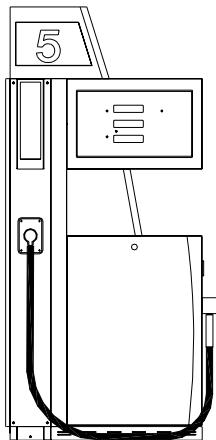


Pos.	Description	Pos.	Description
⇨	Recommended car arrival direction	①②	Fuel products order

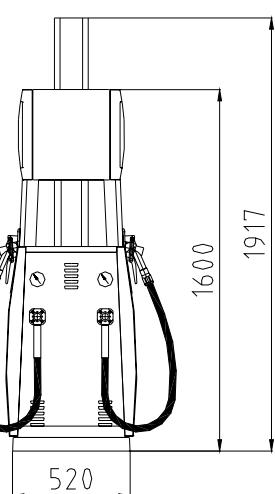
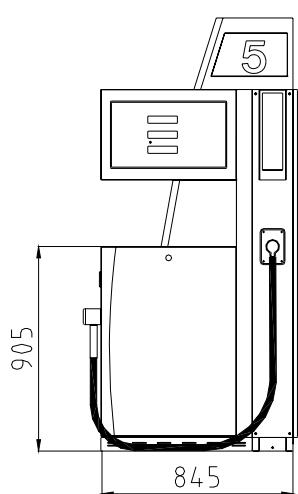
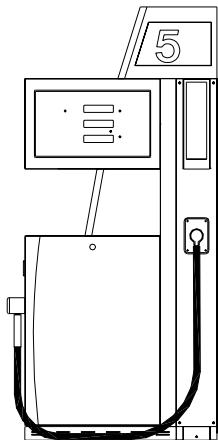
E.2. LPG dispensers series BMP2000.SS/LPG



BMP2011.SSL /LPG-PV



BMP2011.SSR /LPG-PV

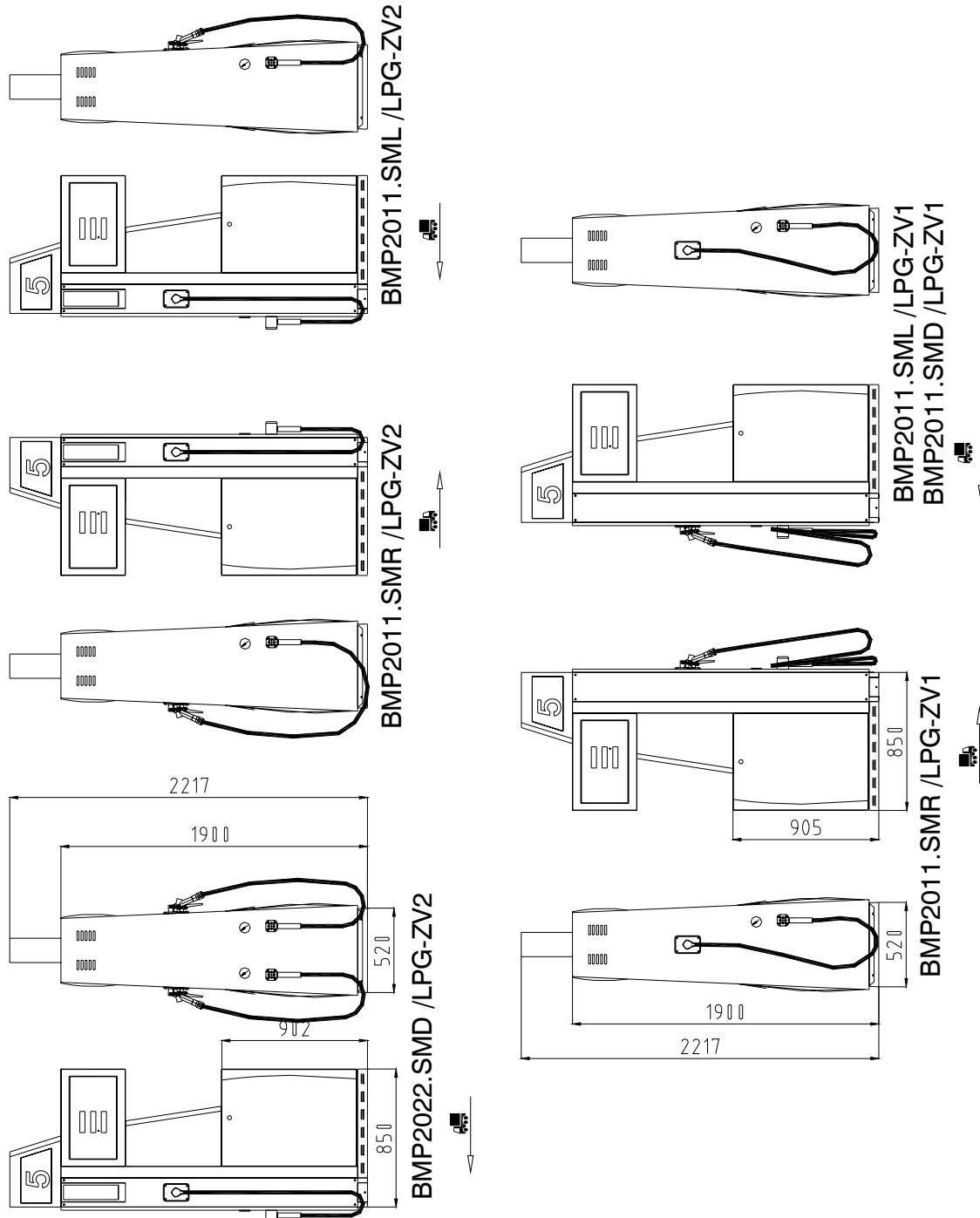


BMP2022.SSD /LPG-PV



Pos.	Description
↔	Recommended car arrival direction

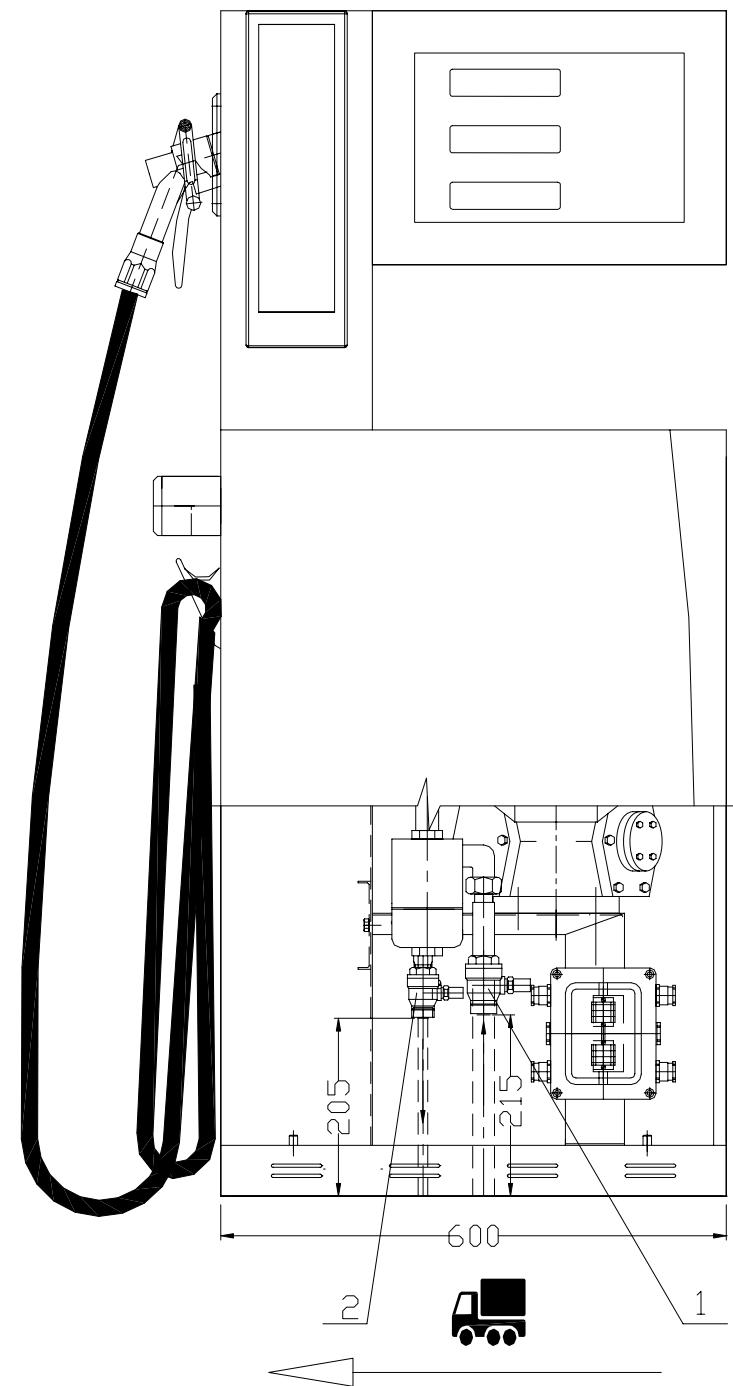
E.3. LPG dispensers series BMP2000.SM/LPG



Pos.	Description
⇨	Recommended car arrival direction

Appendix F – Foundation Plans & Frames

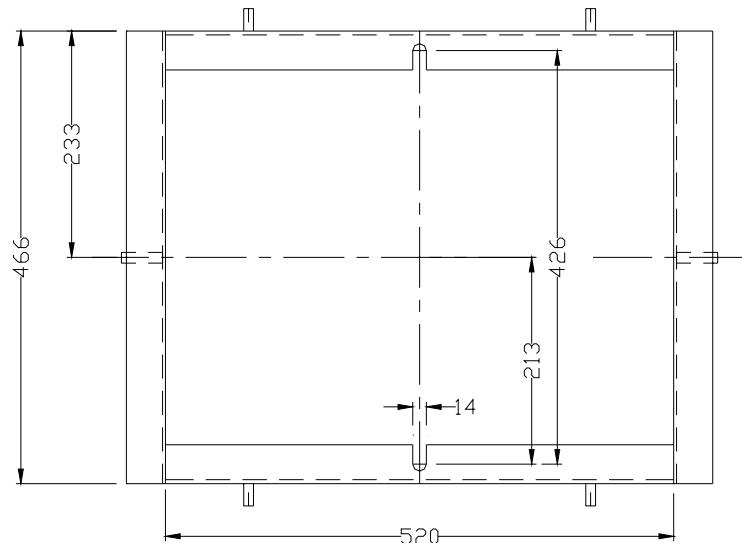
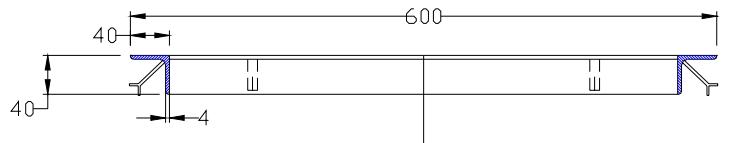
F.1. Inner Connection of BMP511.S /LPG



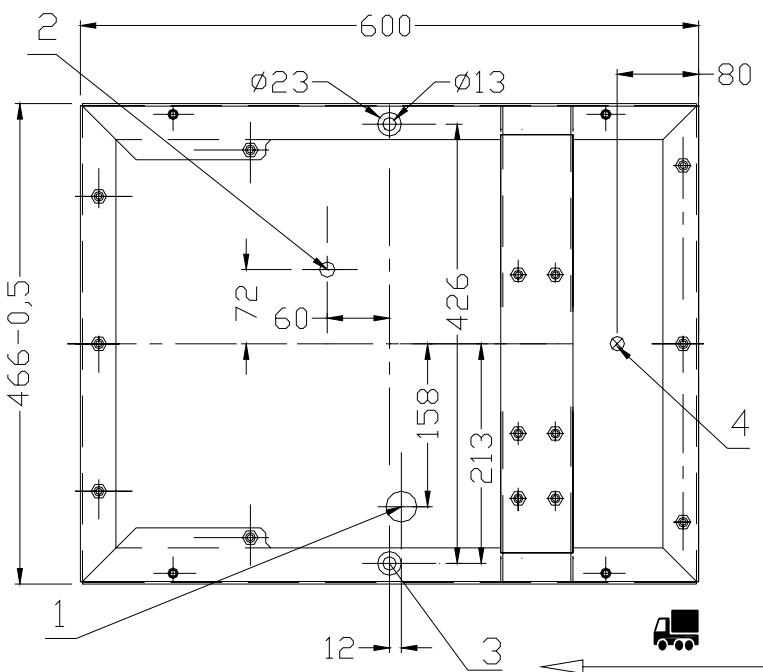
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G ¾"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G ½"
⇒	Recommended car arrival direction

F.2. Base Frame & Ground Plan of BMP511.S /LPG

Base Frame

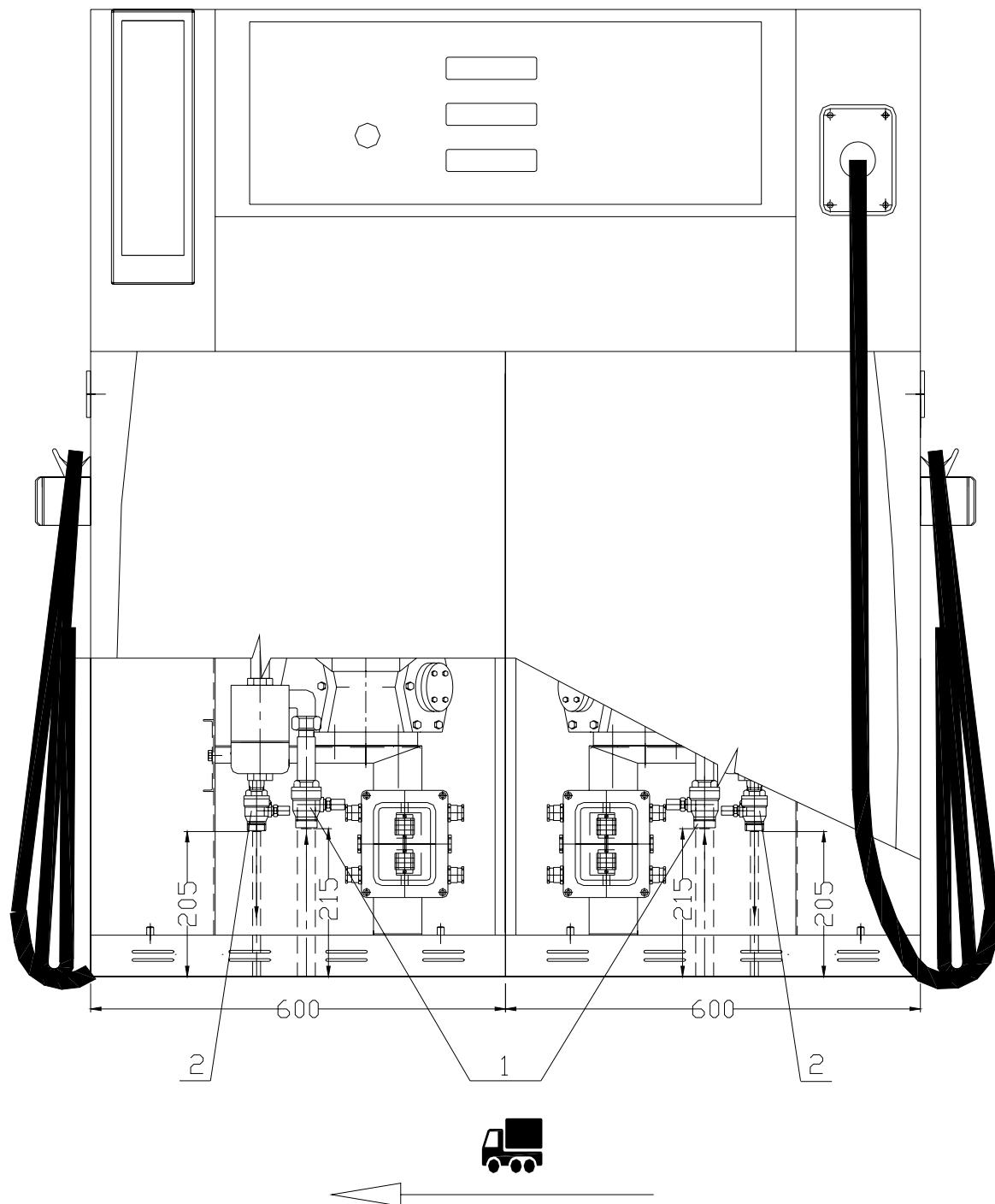


Ground Plan



Pos.	Description	Pos.	Description
1	Input Pipe Axis	4	Electrical Cables Outlets
2	Backward Pipe Axis	↔	Recommended car arrival direction
3	Dispenser Mount Holes		

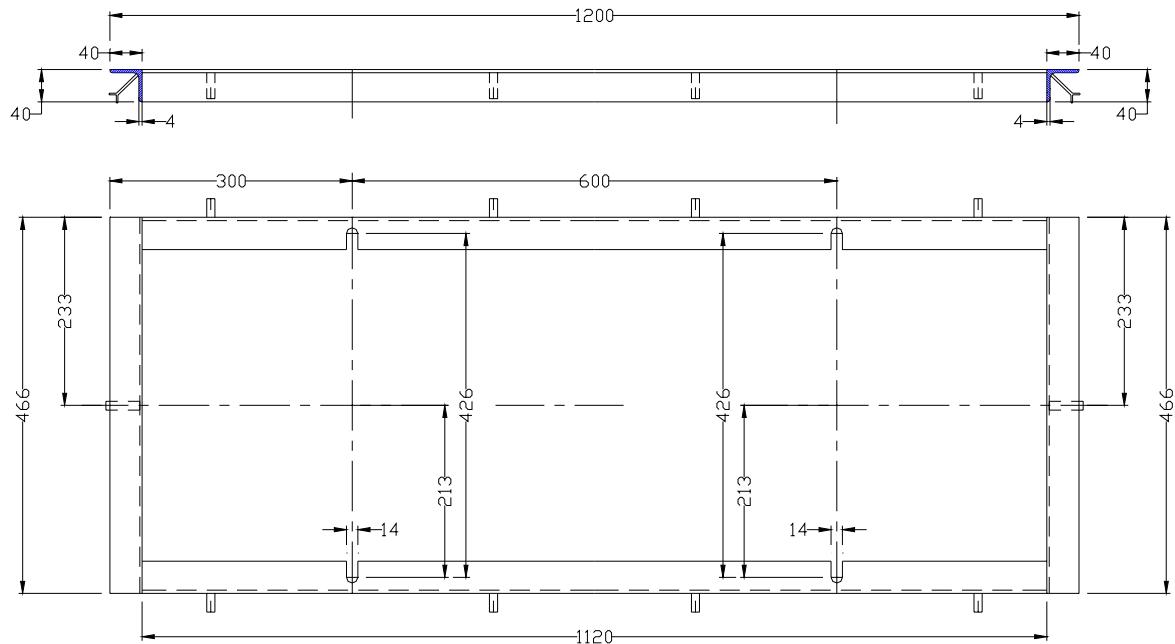
F.3. Inner Connection of BMP522.SD /LPG



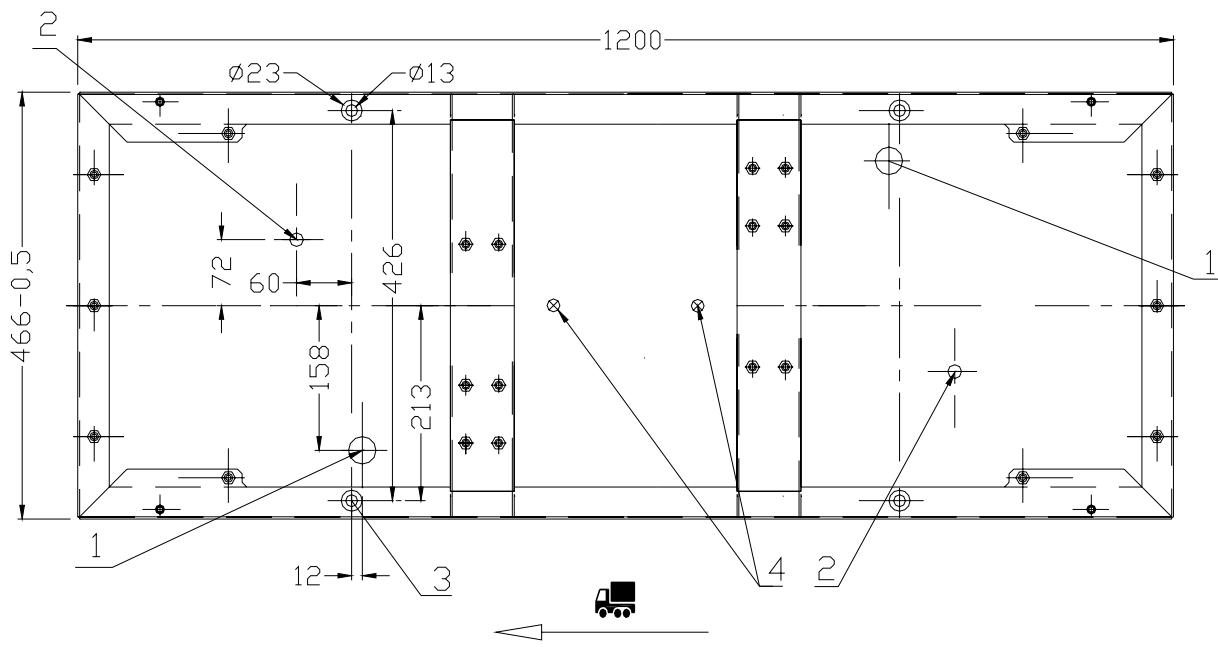
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G ¾"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G ½"
⇨	Recommended car arrival direction

F.4. Base Frame & Ground Plan of BMP522.SD /LPG

Base Frame

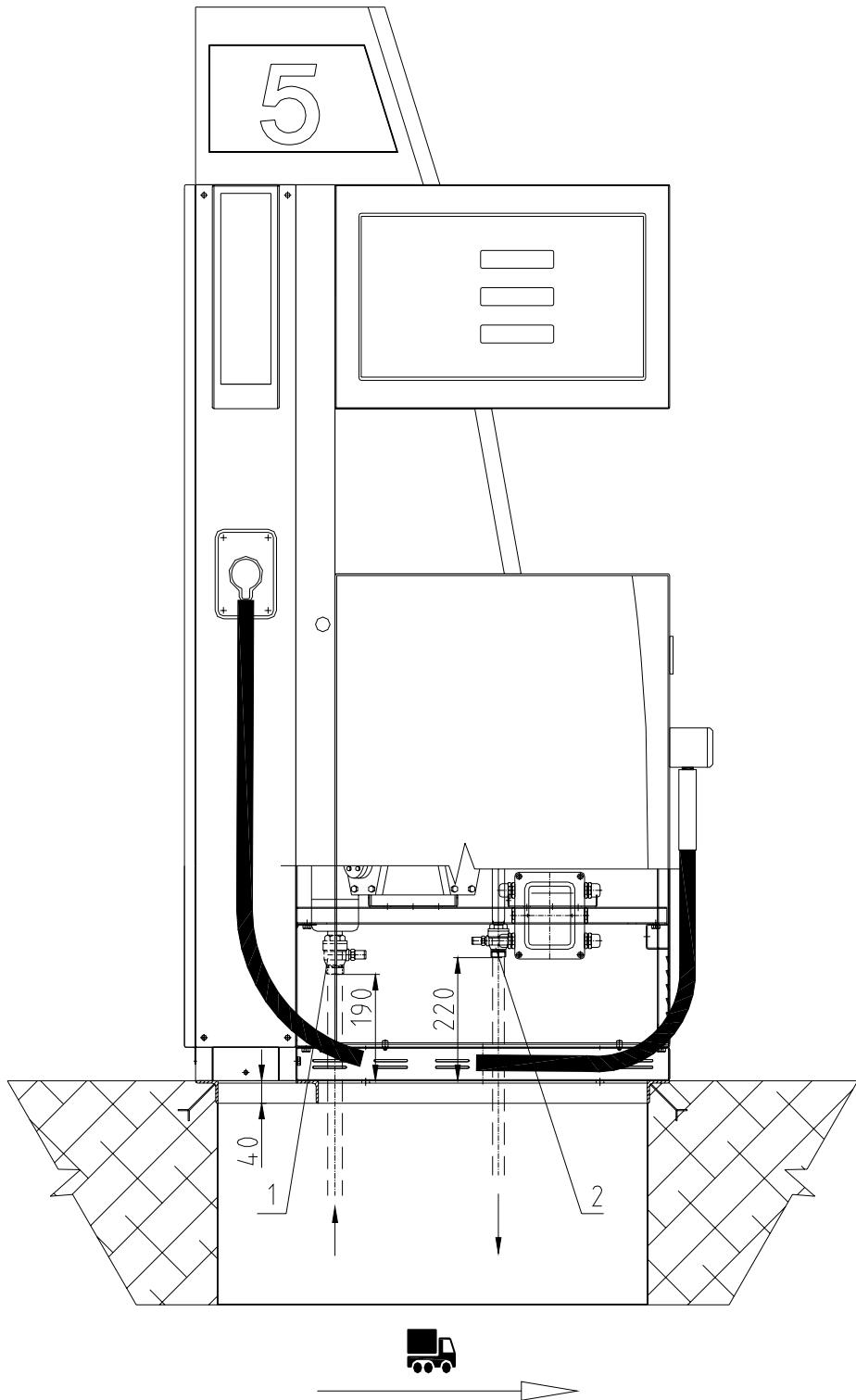


Ground Plan



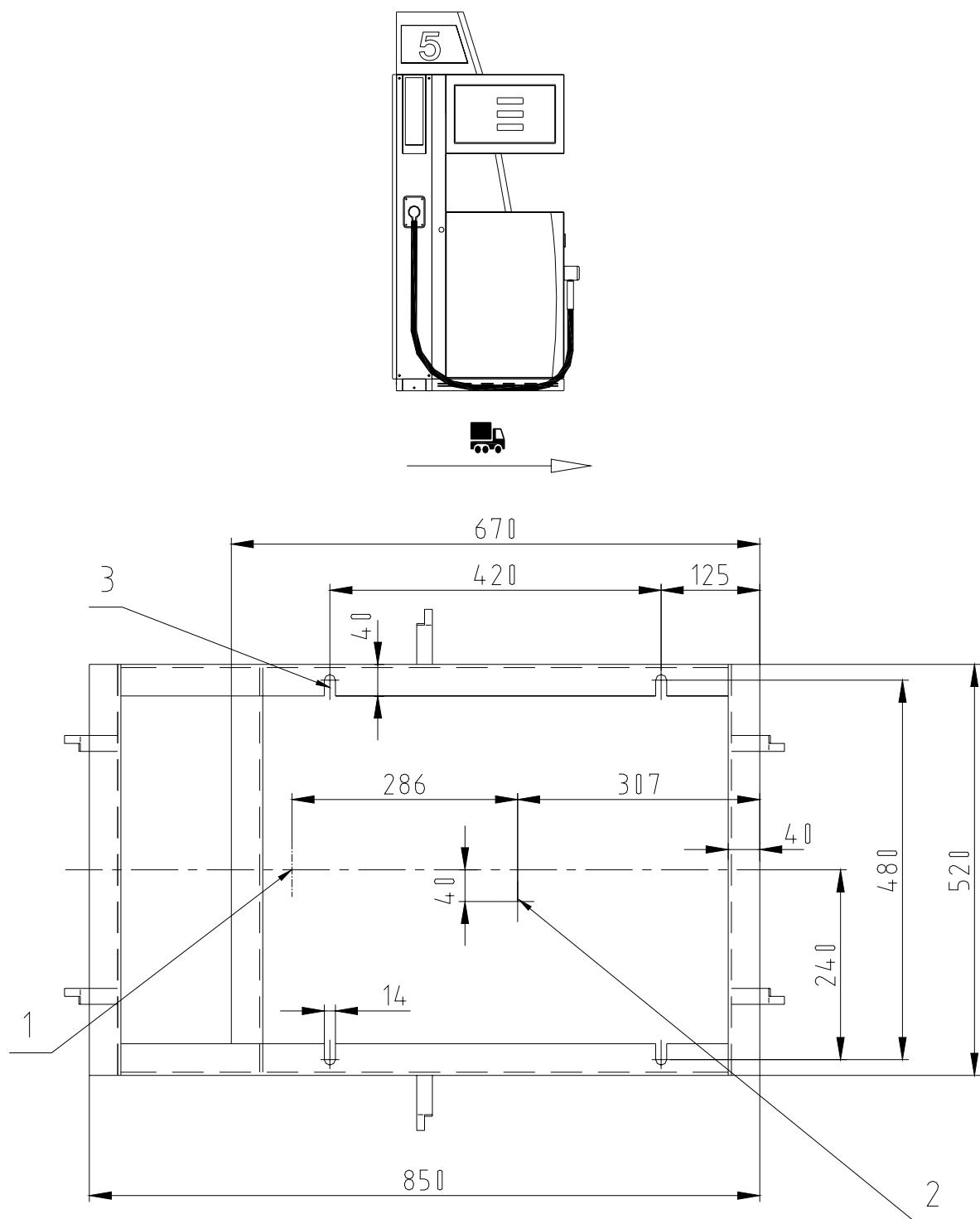
Pos.	Description	Pos.	Description
1	Input Pipe Axis	4	Electrical Cables Outlets
2	Backward Pipe Axis	⇒	Recommended car arrival direction
3	Dispenser Mount Holes		

F.5. Inner Connection of BMP2011.SS /LPG-PV



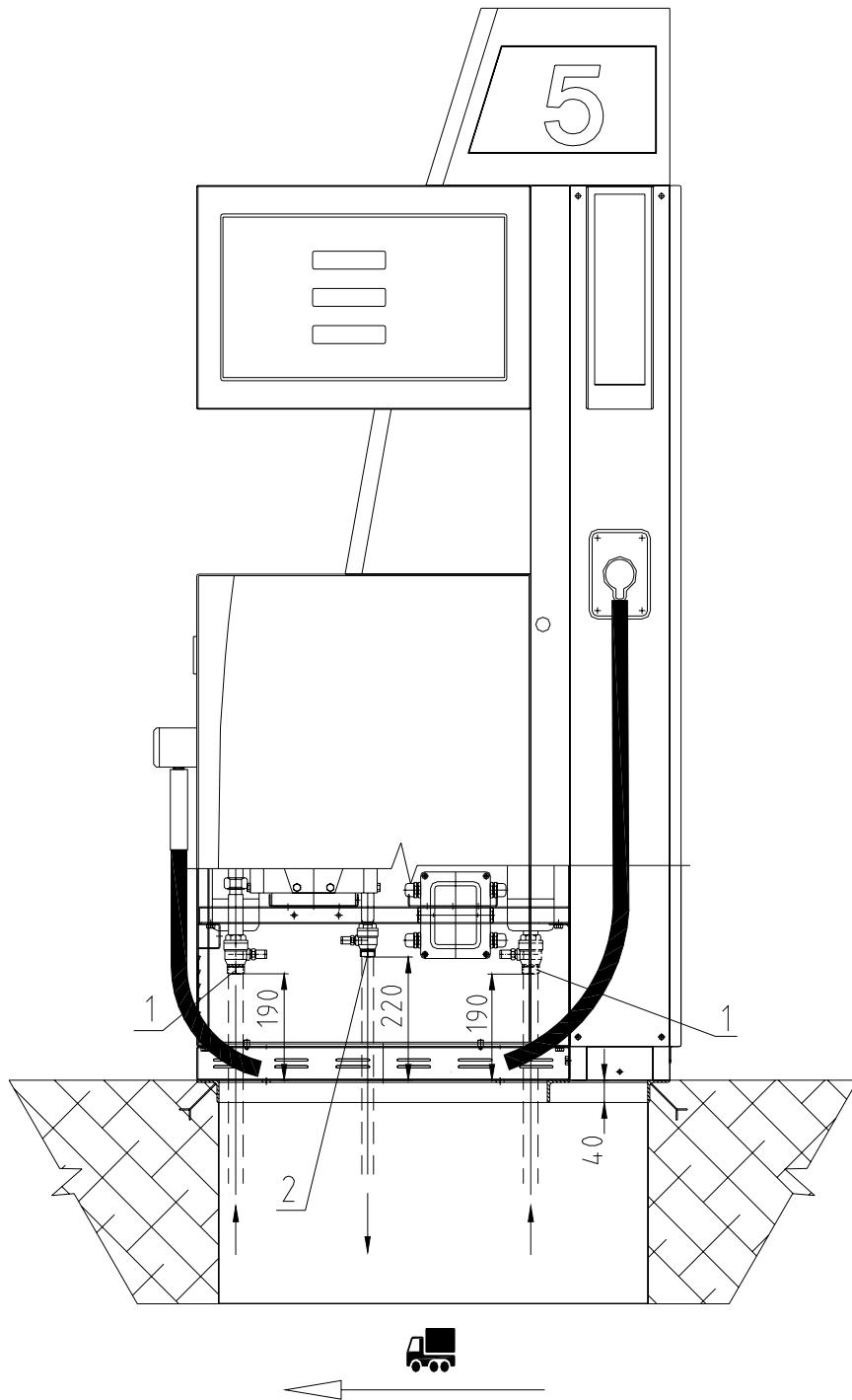
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"
↔	Recommended car arrival direction

F.6. Ground Plan of BMP2011.SS /LPG-PV



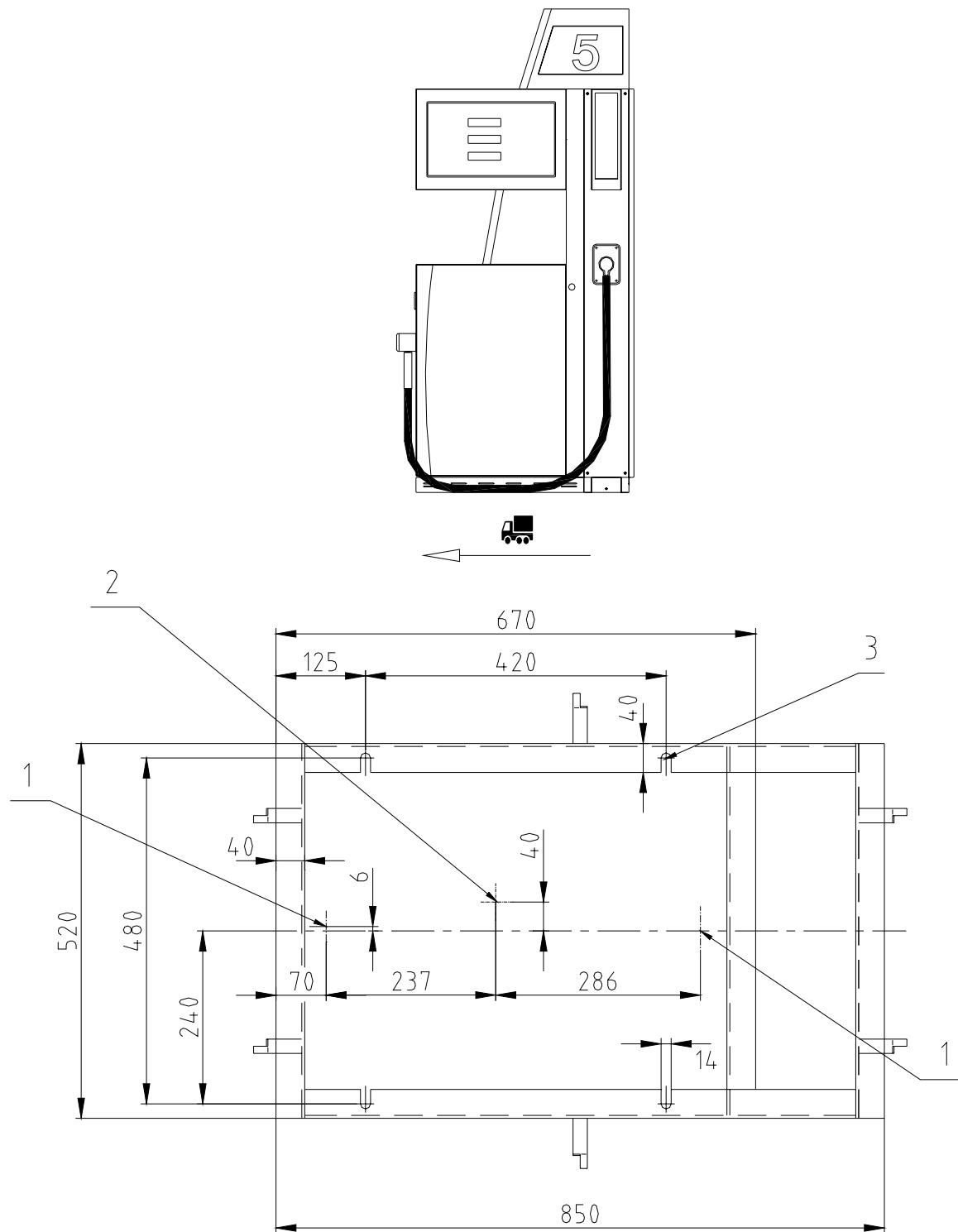
Pos.	Description	Pos.	Description
1	Input Pipe Axis	3	Dispenser Mount Holes
2	Backward Pipe Axis	↔	Recommended car arrival direction

F.7. Inner Connection of BMP2022.SSD /LPG-PV



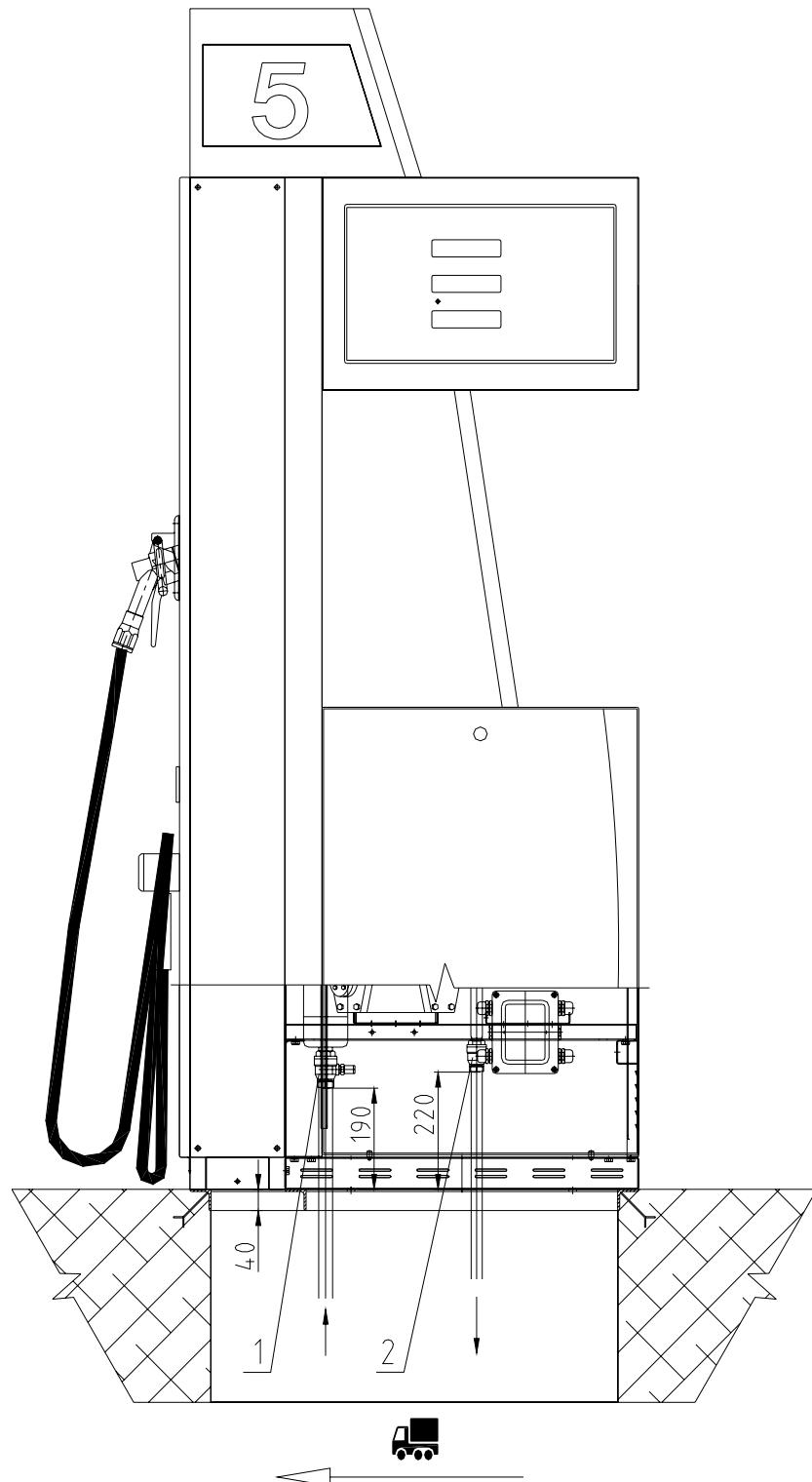
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"
⇒	Recommended car arrival direction

F.8. Ground Plan of BMP2022.SSD /LPG-PV



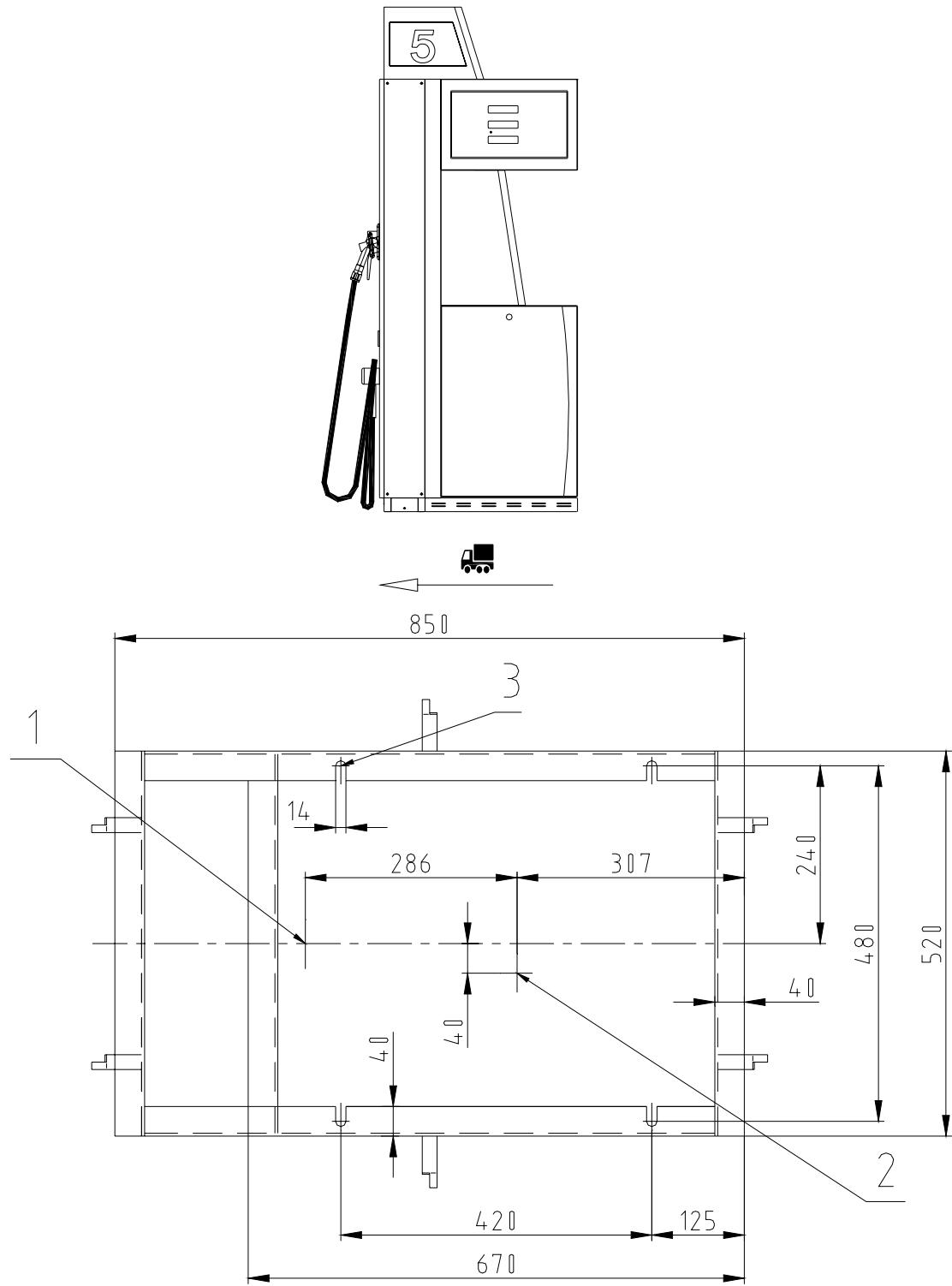
Pos.	Description	Pos.	Description
1	Input Pipe Axis	3	Dispenser Mount Holes
2	Backward Pipe Axis	↔	Recommended car arrival direction

F.9. Inner Connection of BMP2011.SM /LPG-ZV1



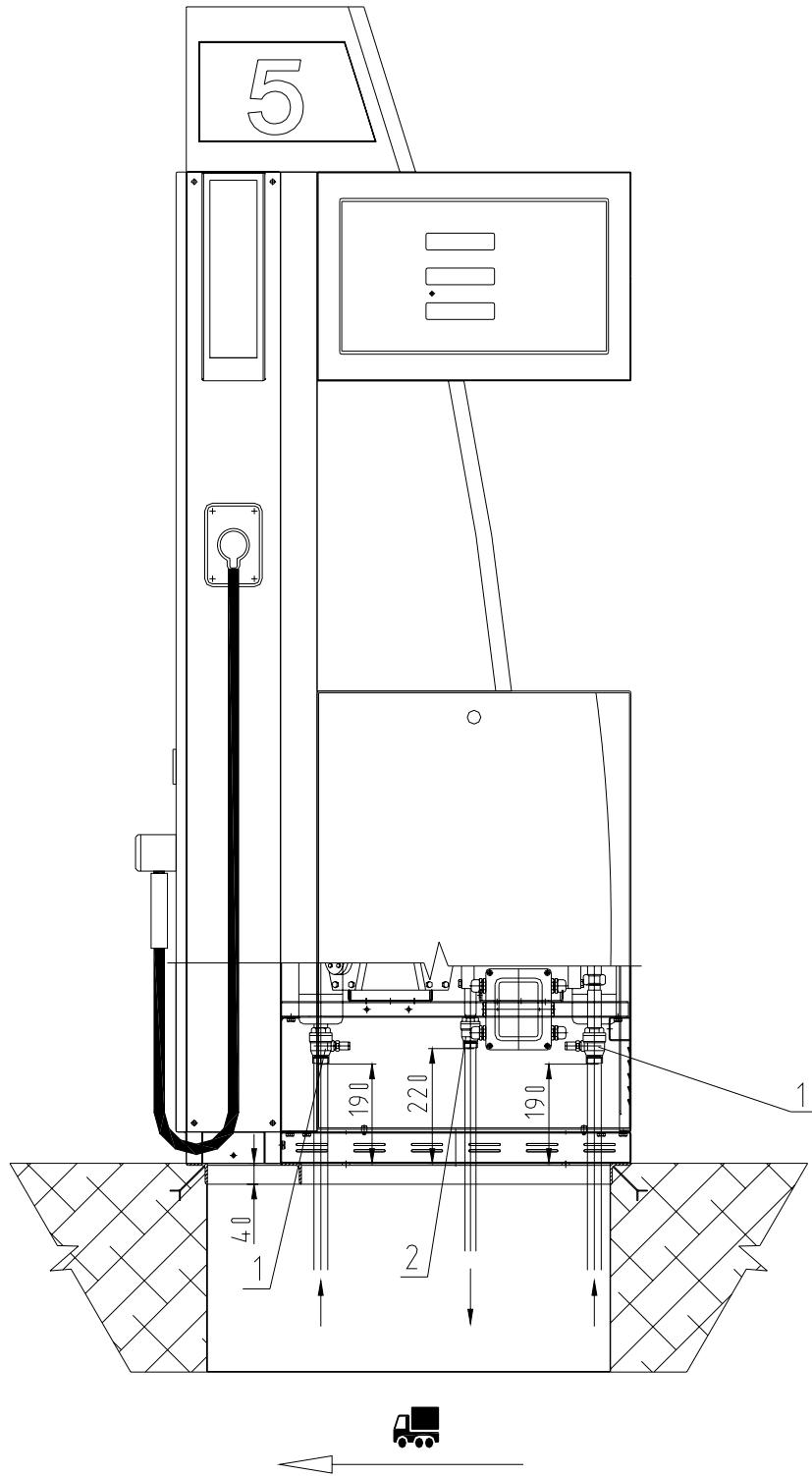
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"
⇒	Recommended car arrival direction

F.10. Ground Plan of BMP2011.SM /LPG-ZV1



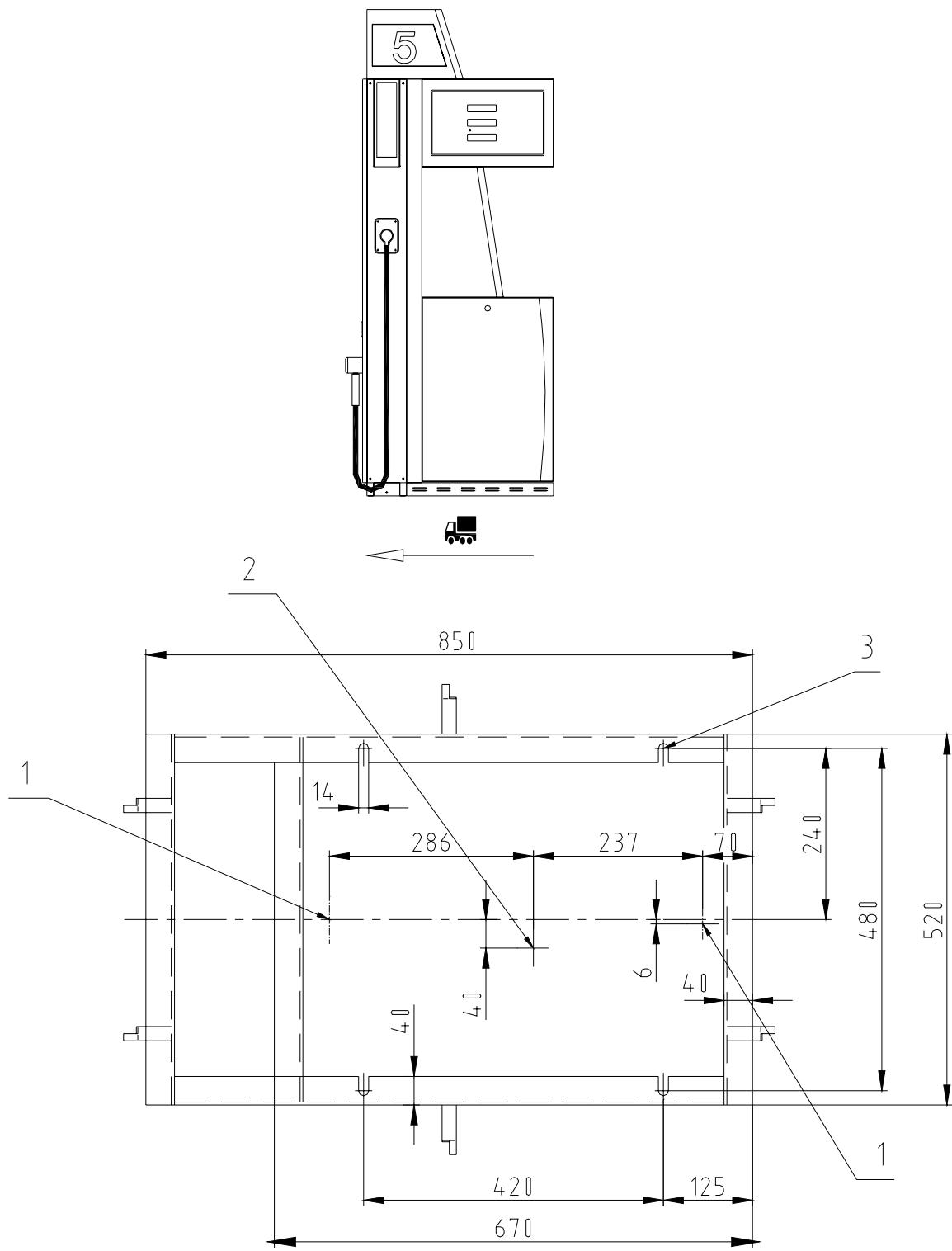
Pos.	Description	Pos.	Description
1	Input Pipe Axis	3	Dispenser Mount Holes
2	Backward Pipe Axis	⇒	Recommended car arrival direction

F.11. Inner Connection of BMP2022.SMD /LPG-ZV2



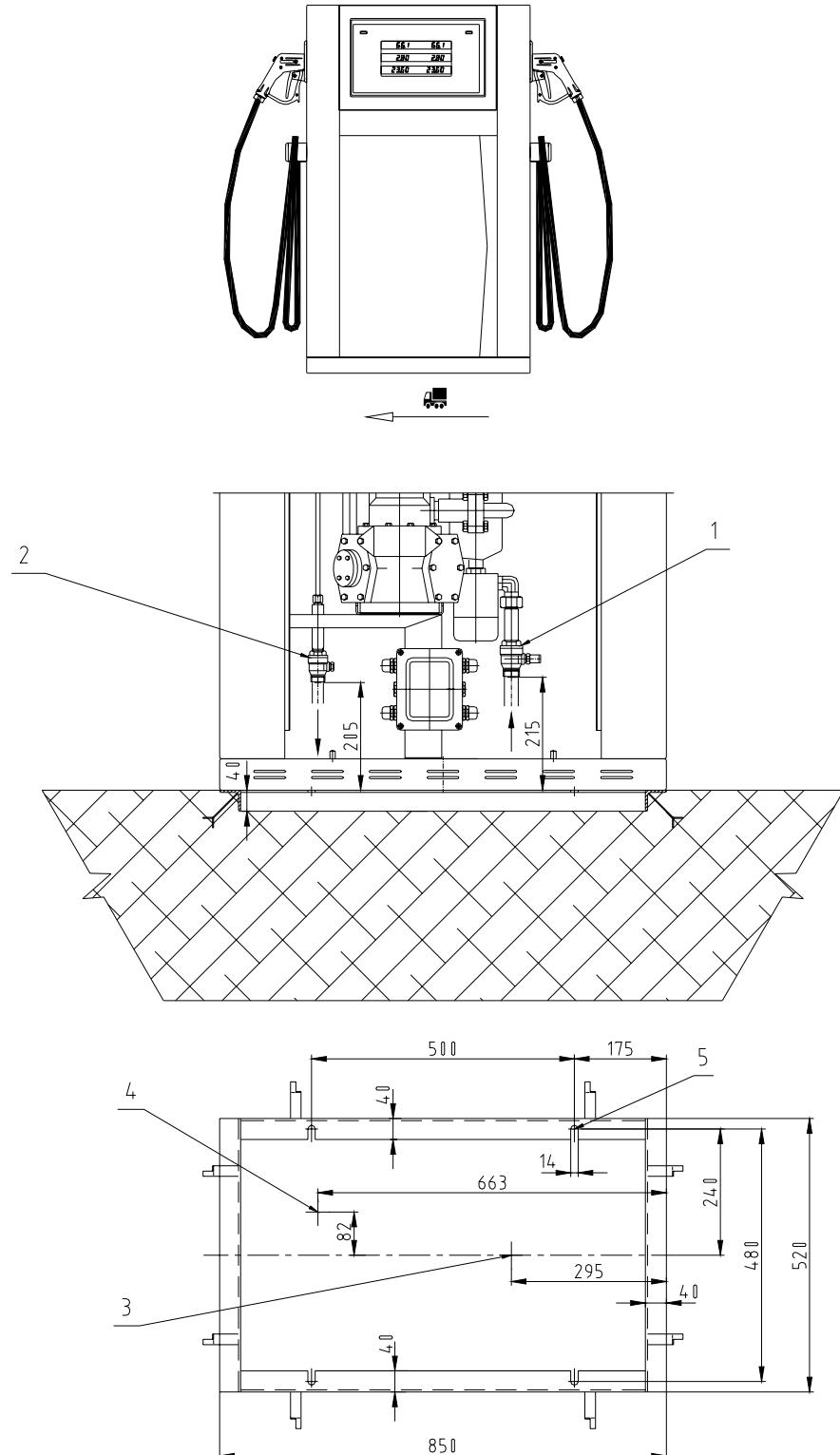
Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"
↔	Recommended car arrival direction

F.12. Ground Plan of BMP2022.SMD /LPG-ZV2



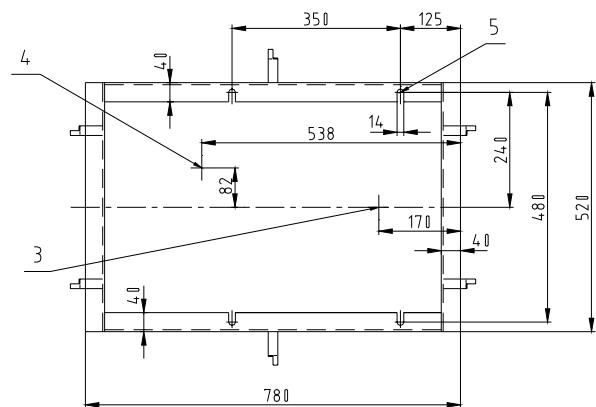
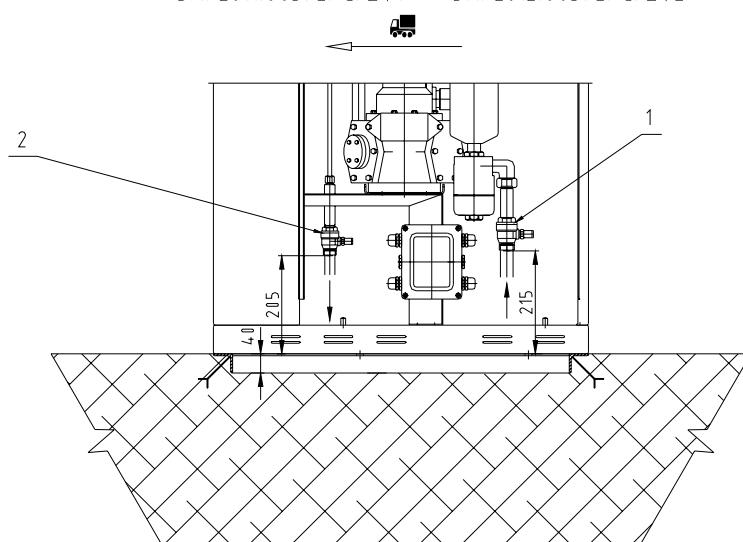
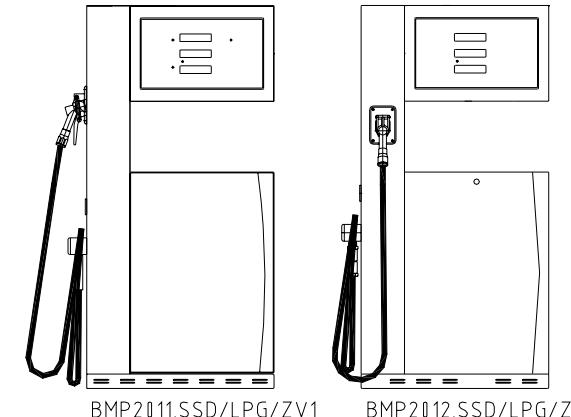
Pos.	Description	Pos.	Description
1	Input Pipe Axis	3	Dispenser Mount Holes
2	Backward Pipe Axis	4	⇒ Recommended car arrival direction

F.13. Foundation plan of BMP512.SDX /LPG



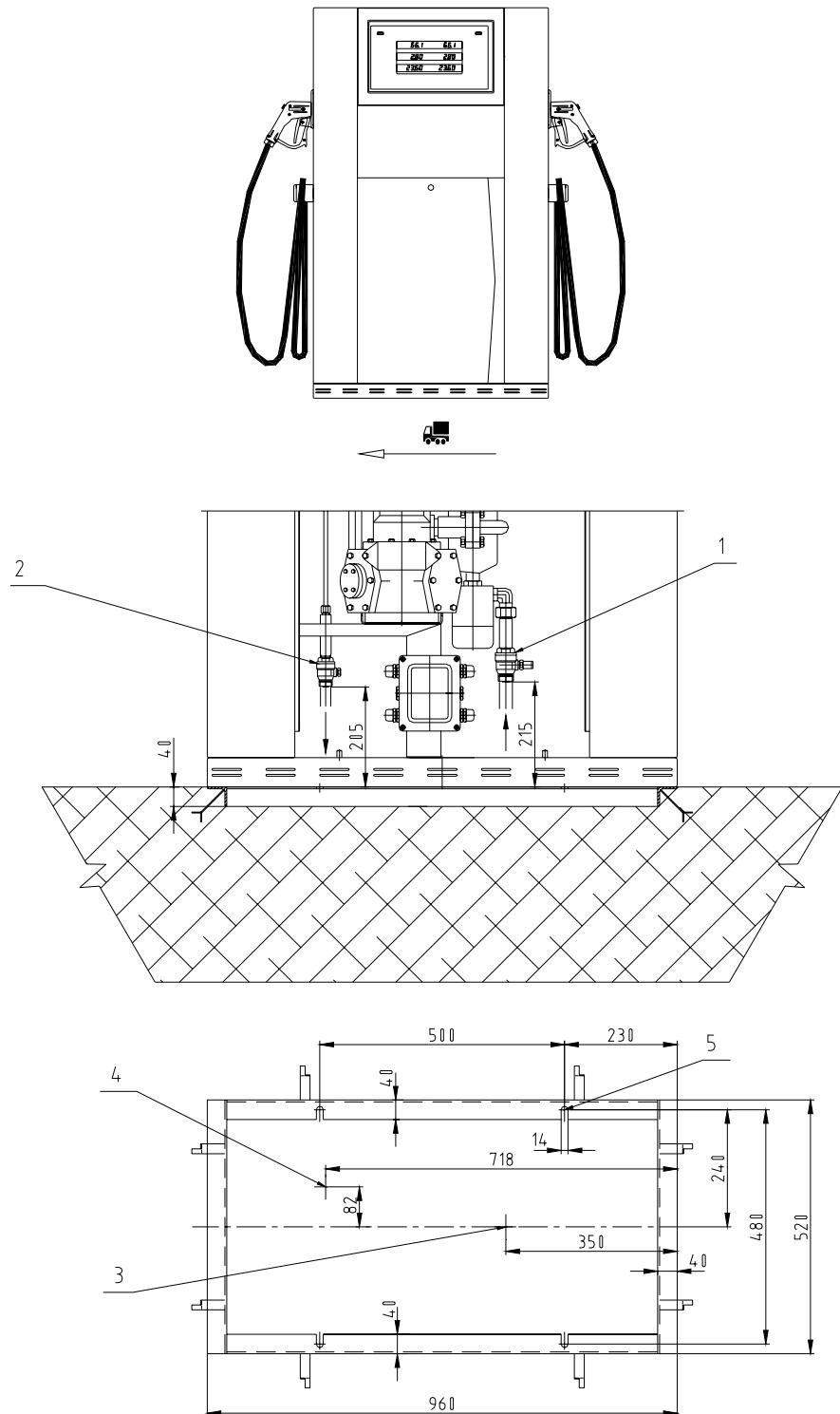
Pos.	Description	Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"	3	Input Pipe Axis
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"	4	Backward Pipe Axis
	Recommended car arrival direction	5	Dispenser Mount Holes

F.14. Foundation plan of BMP2011.SSD /LPG/ZV1 & BMP2012.SSD /LPG/ZV2



Pos.	Description	Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G ¾"	3	Input Pipe Axis
2	Backward Pipe terminated by LPG Ball Valve with inner thread G ½"	4	Backward Pipe Axis
	Recommended car arrival direction	5	Dispenser Mount Holes

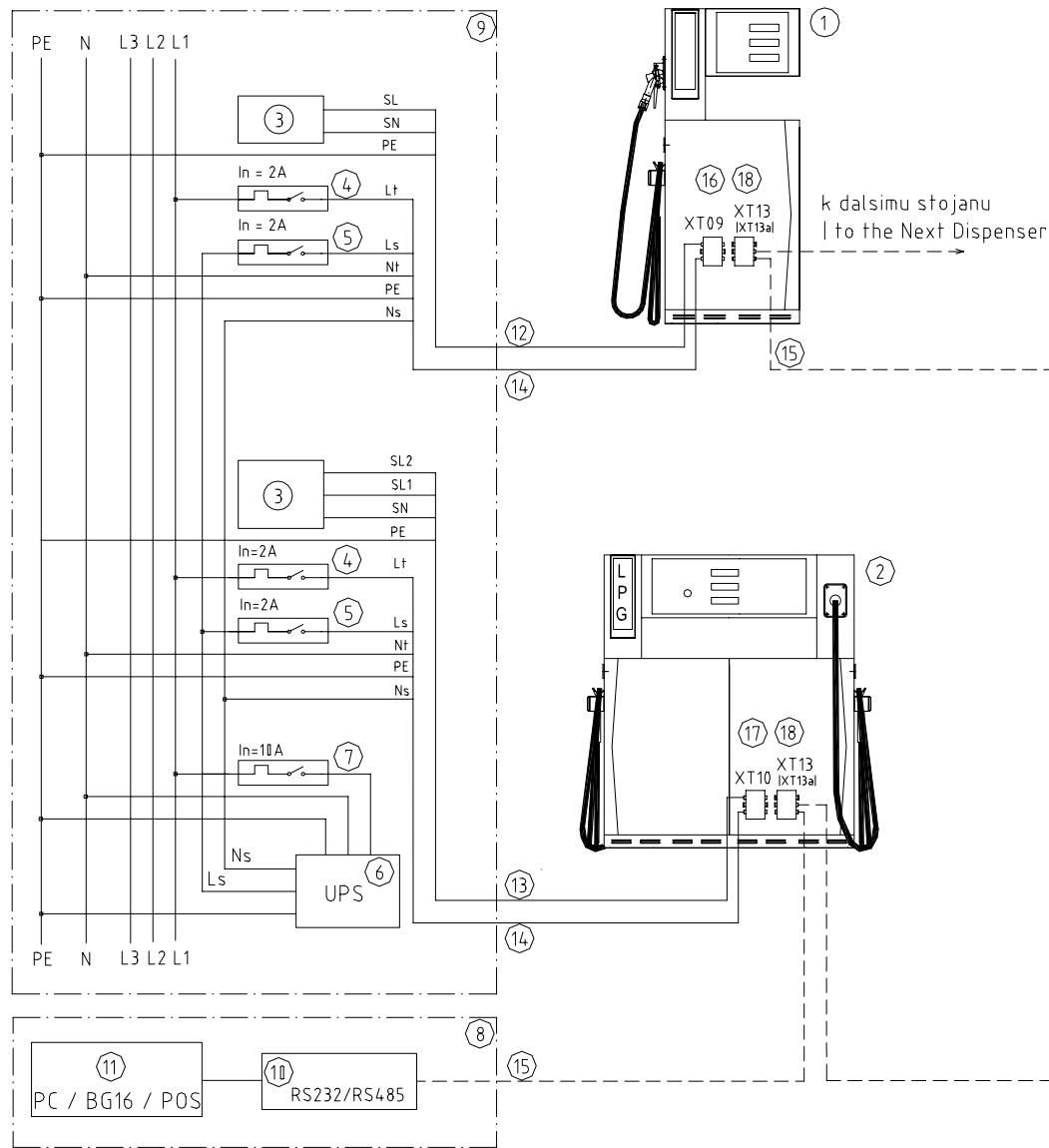
F.15. Foundation plan of BMP2012.SID /LPG "Island"



Pos.	Description	Pos.	Description
1	Input Pipe terminated by LPG Ball Valve with inner thread G 3/4"	3	Input Pipe Axis
2	Backward Pipe terminated by LPG Ball Valve with inner thread G 1/2"	4	Backward Pipe Axis
	Recommended car arrival direction	5	Dispenser Mount Holes

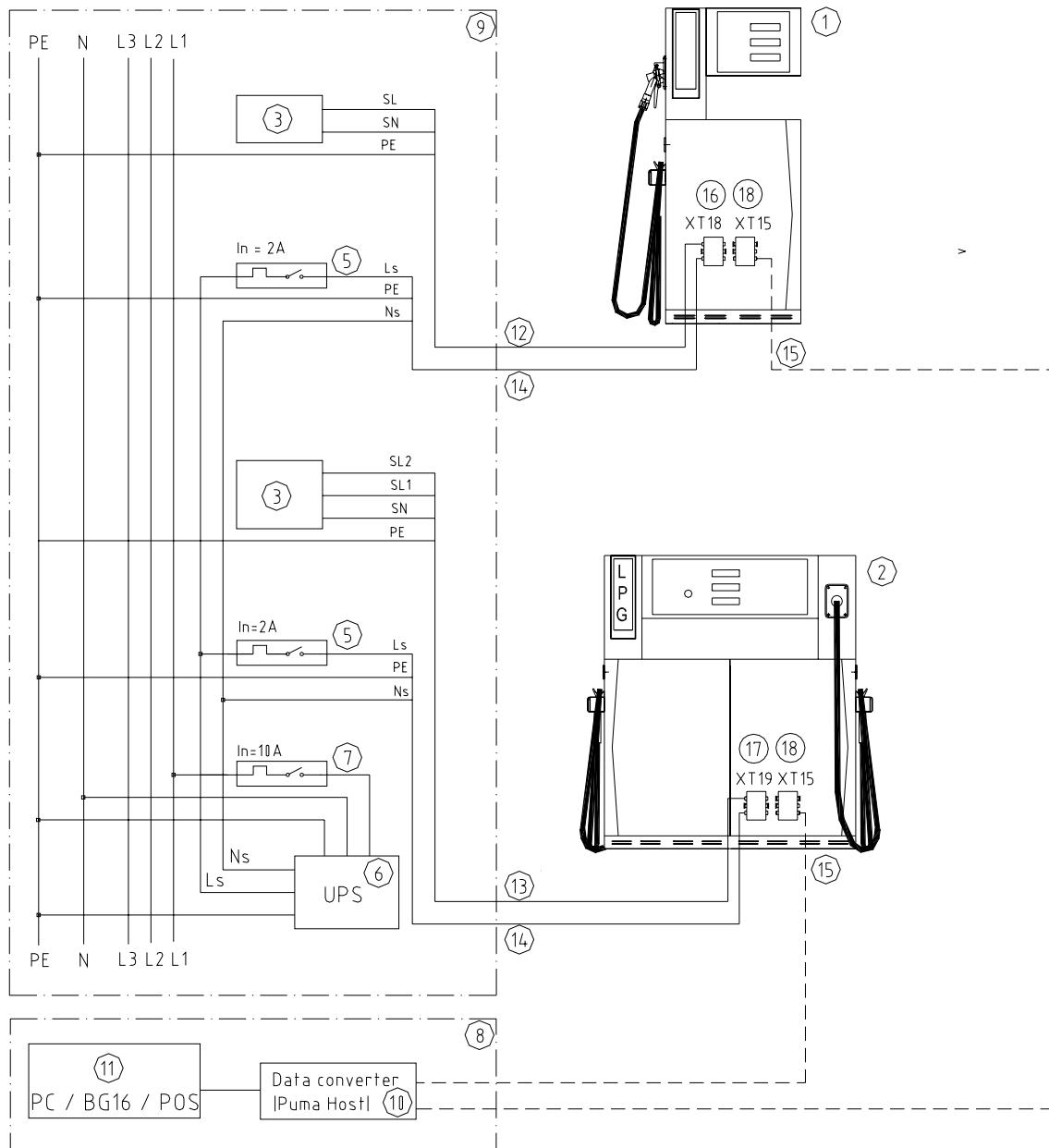
Appendix G – Electrical schemes

G.1. Electrical scheme with counters PDE, ADP or IFSF



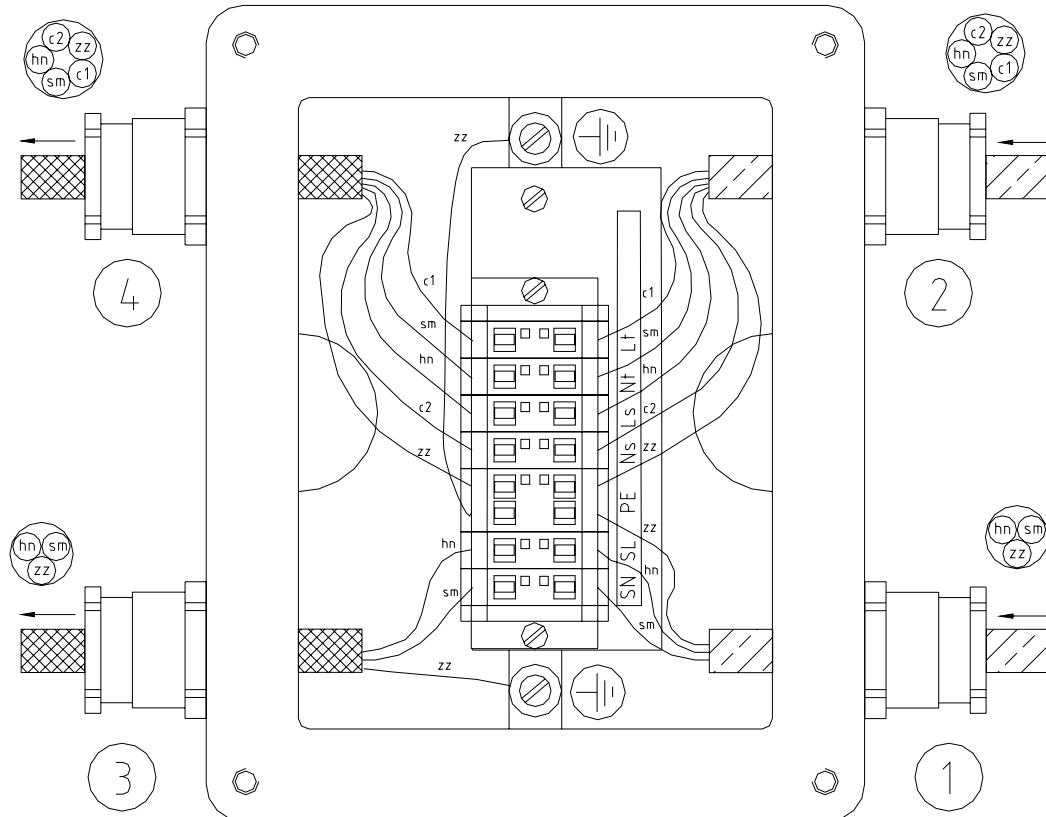
Pos.	Description	Pos.	Description
1	One-nozzle LPG dispenser	10	Data converter (RS485 / RS232)
2	Two-nozzles LPG dispenser	11	Controlling device (PC, controller or console BG16)
3	LPG pump control unit	12	Cable for one LPG pump switching - CMSM 3C x 1.5
4	Overcurrent breaker for switching elements - In=2A	13	Cable for two LPG pumps switching - CMSM 4B x 1.5
5	Overcurrent breaker for counter - In=2A	14	Counter power cable - type CMSM 5C x 1.5
6	Uninterruptable Power Supply with voltage regulator	15	Data line cable - type CMFM 4D x 1.0
7	Overcurrent breaker for UPS	16	Power distribution box for one-nozzle dispenser - XT09
8	Room of operators (kiosk)	17	Power distribution box for two-nozzles dispenser - XT10
9	Main power distribution of service station	18	Data distribution box XT13 for PDE or IFSF counters (for ADP counters is used box XT13a)

G.2. Electrical scheme with counters Logitron



Pos.	Description	Pos.	Description
1	One-nozzle LPG dispenser	10	Data converter (RS485 / RS232)
2	Two-nozzles LPG dispenser	11	Controlling device (PC, controller or console BG16)
3	LPG pump control unit	12	Cable for one LPG pump switching - CMSM 3C x 1.5
4		13	Cable for two LPG pumps switching - CMSM 4B x 1.5
5	Overcurrent breaker for counter - In=2A	14	Counter power cable - type CMSM 3C x 1.5
6	Uninterruptable Power Supply with voltage regulator	15	Data line cable - type CMFM 4D x 1.0
7	Overcurrent breaker for UPS	16	Power distribution box for one-nozzle dispenser - XT18
8	Room of operators (kiosk)	17	Power distribution box for two-nozzles dispenser - XT19
9	Main power distribution of service station	18	Data distribution box XT15

G.3. Power distribution box scheme - XT09



Input

1	Power cable for one LPG pump switching Type: CMSM 3C x 1.5 (recommended) Connection: Main distribution <---> XT09	
SL	switching phase of LPG pump	brown (hn)
SN	switching voltage (max.250V/1A)	light blue (sm)
PE	protection earth	green-yellow (zz)

Output

3	Power cable for one LPG pump switching Type: CMSM 3C x 1.5 Connection: XT09 <---> dispenser's counter	
SL	switching phase of LPG pump	brown (hn)
SN	switching voltage (max.250V/1A)	light blue (sm)
PE	ochranný vodič	green-yellow (zz)

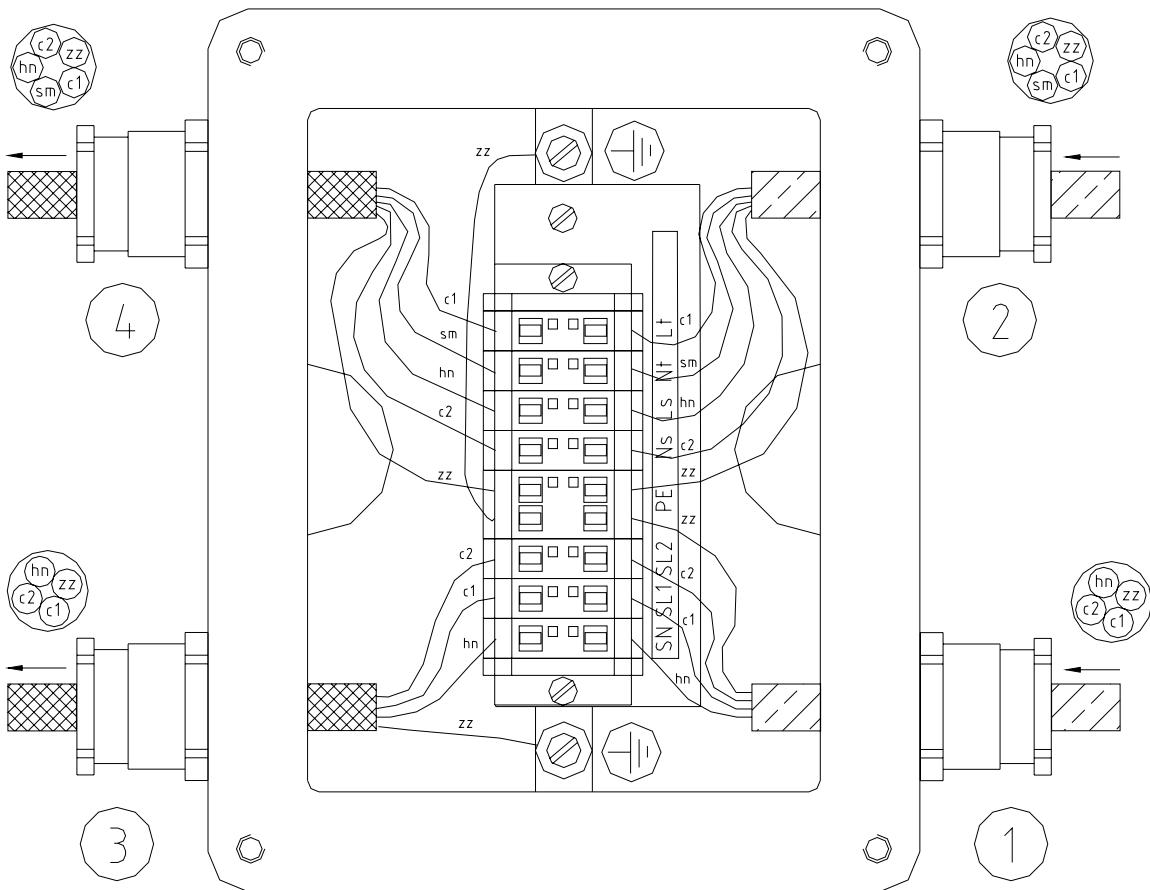
2	Counter Power Supply Cable Type: CMSM 5C x 1.5 (recommended) Connection: Main distribution <---> XT09	
Ns	neutral wire for counter	black2 (c2)
Ls	stabilized phase 230V for counter	brown (hn)
Nt	neutral wire for switches	light blue (sm)
Lt	phase 230V for switches	black1 (c1)
PE	protection earth	green-yellow (zz)

4	Counter Power Supply Cable Type: CMSM 5C x 1 Connection: XT09 <---> dispenser's counter	
Ns	neutral wire for counter	black2 (c2)
Ls	stabilized phase 230V for counter	brown (hn)
Nt	neutral wire for switches	light blue (sm)
Lt	phase 230V for switches	black1 (c1)
PE	protection earth	green-yellow (zz)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be usedonly clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.4. Power distribution box scheme - XT10



Input

1	Power cable for two LPG pumps switching Type: CMSM 4B x 1.5 (recommended) Connection: Main distribution <--> XT10	
SL1	switching phase of LPG pump 1	black1 (c1)
SL2	switching phase of LPG pump 2	black 2 (c2)
SN	switching voltage (max.250V/1A)	brown (hn)
PE	protection earth	green-yellow (zz)

Output

3	Power cable for two LPG pumps switching Typ: CMSM 4B x 1.5 Propojení: XT10 <--> dispenser's counter	
SL1	switching phase of LPG pump 1	black1 (c1)
SL2	switching phase of LPG pump 2	black 2 (c2)
SN	switching voltage (max.250V/1A)	brown (hn)
PE	protection earth	green-yellow (zz)

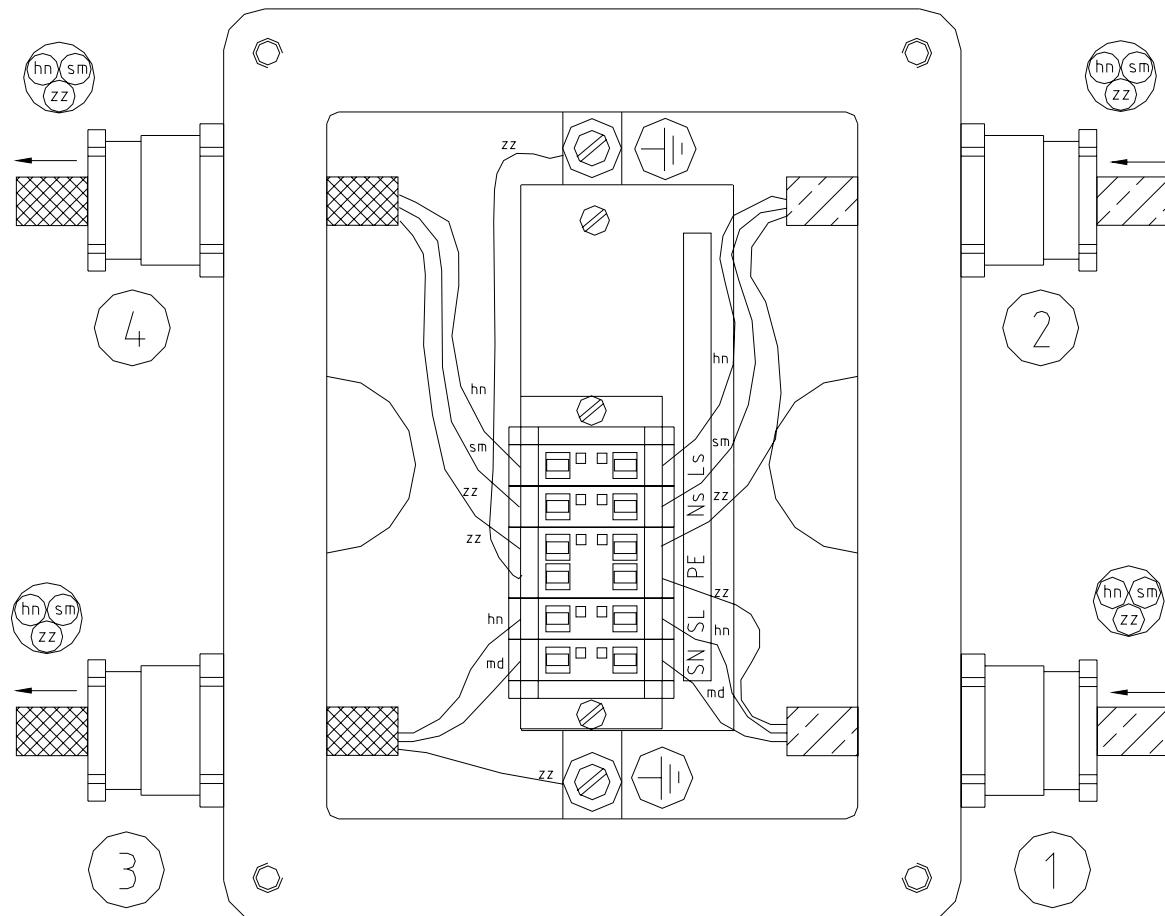
2	Counter Power Supply Cable Type: CMSM 5C x 1.5 (recommended) Connection: Main distribution <--> XT10	
Ns	neutral wire for counter	black2 (c2)
Ls	stabilized phase 230V for counter	brown (hn)
Nt	neutral wire for switches	light blue (sm)
Lt	phase 230V for switches	black1 (c1)
PE	protection earth	green-yellow (zz)

4	Counter Power Supply Cable Type: CMSM 5C x 1 Connection: XT10 <--> dispenser's counter	
Ns	neutral wire for counter	black2 (c2)
Ls	stabilized phase 230V for counter	brown (hn)
Nt	neutral wire for switches	light blue (sm)
Lt	phase 230V for switches	black1 (c1)
PE	protection earth	green-yellow (zz)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be used only clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.5. Power distribution box scheme - XT18



Input

1	Power cable for one LPG pump switching	
Type:	CMSM 3C x 1.5 (recommended)	
Connection:	Main distribution <-->	XT18
SL	switching phase of LPG pump	brown (hn)
SN	switching voltage (max.250V/1A)	light blue (sm)
PE	protection earth	green-yellow (zz)

Output

3	Power cable for one LPG pump switching	
Type:	CMSM 3C x 1.5	
Connection:	XT18 <-->	dispenser's counter
SL	switching phase of LPG pump	brown (hn)
SN	switching voltage (max.250V/1A)	light blue (sm)
PE	protection earth	green-yellow (zz)

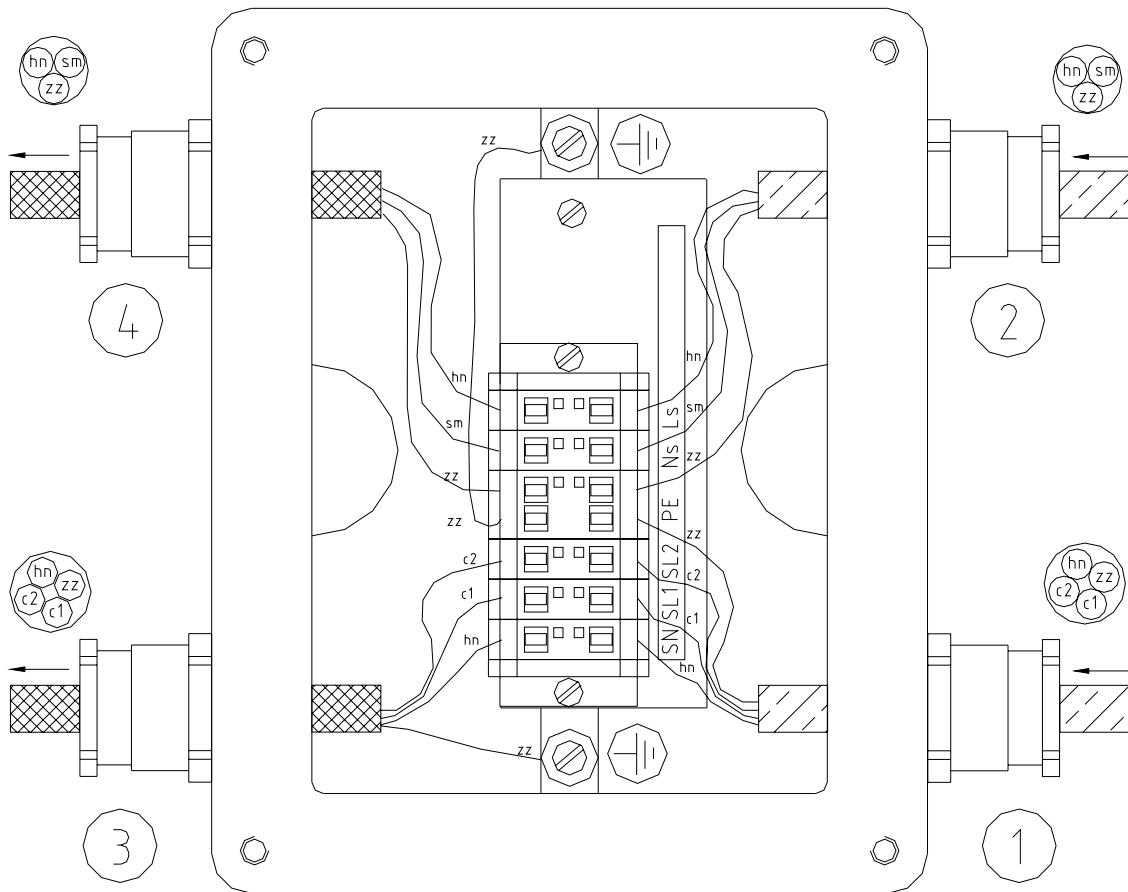
2	Counter Power Supply Cable	
Type:	CMSM 3C x 1.5 (recommended)	
Connection:	Main distribution <-->	XT18
Ns	neutral wire for counter	light blue (sm)
Ls	stabilized phase 230V for counter	brown (hn)
PE	protection earth	green-yellow (zz)

4	Counter Power Supply Cable	
Type:	CMSM 3C x 1.5	
Connection:	XT18 <-->	dispenser's counter
Ns	neutral wire for counter	light blue (sm)
Ls	stabilized phase 230V for counter	brown (hn)
PE	protection earth	green-yellow (zz)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be usedonly clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.6. Power distribution box scheme - XT19



Input

1	Power cable for two LPG pumps switching Type: CMSM 4B x 1.5 (recommended) Connection: Main distribution <---> XT19	
SL1	switching phase of LPG pump 1	black1 (c1)
SL2	switching phase of LPG pump 2	black 2 (c2)
SN	switching voltage (max.250V/1A)	brown (hn)
PE	protection earth	green-yellow (zz)

Output

3	Power cable for two LPG pumps switching Typ: CMSM 4B x 1.5 Propojení: XT19 <---> dispenser's counter	
SL1	switching phase of LPG pump 1	black1 (c1)
SL2	switching phase of LPG pump 2	black 2 (c2)
SN	switching voltage (max.250V/1A)	brown (hn)
PE	protection earth	green-yellow (zz)

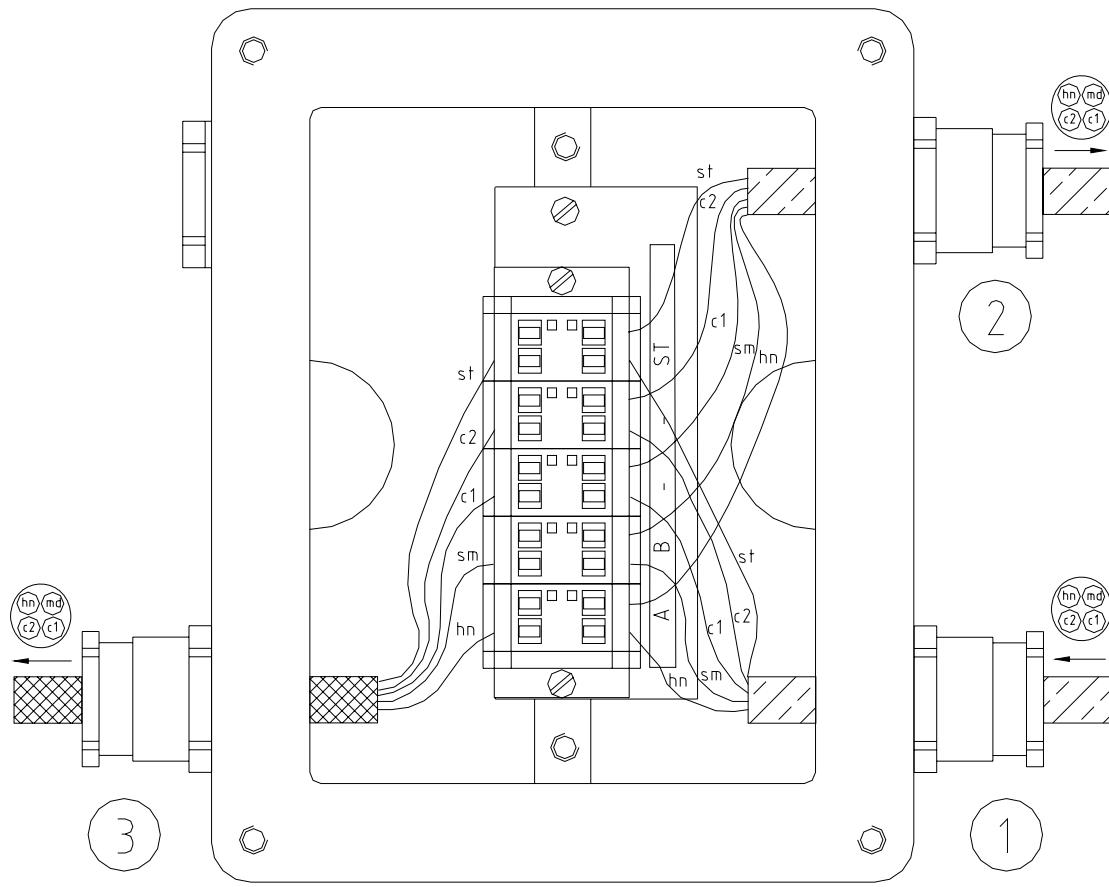
2	Counter Power Supply Cable Type: CMSM 3C x 1.5 (recommended) Connection: Main distribution <---> XT19	
Ns	neutral wire for counter	light blue (sm)
Ls	stabilized phase 230V for counter	brown (hn)
PE	protection earth	green-yellow (zz)

4	Counter Power Supply Cable Type: CMSM 3C x 1.5 Connection: XT19 <---> dispenser's counter	
Ns	neutral wire for counter	light blue (sm)
Ls	stabilized phase 230V for counter	brown (hn)
PE	protection earth	green-yellow (zz)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be used only clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.7. Data line distribution box scheme - XT13



Input

1 Shielded Data Line Cable		
Type: CMFM 4D x 1.0 (recommended)		
Connection: kiosk/dispenser <--> XT13		
A	Line A	brown (hn)
B	Line B	light blue (sm)
-	not used	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

Output

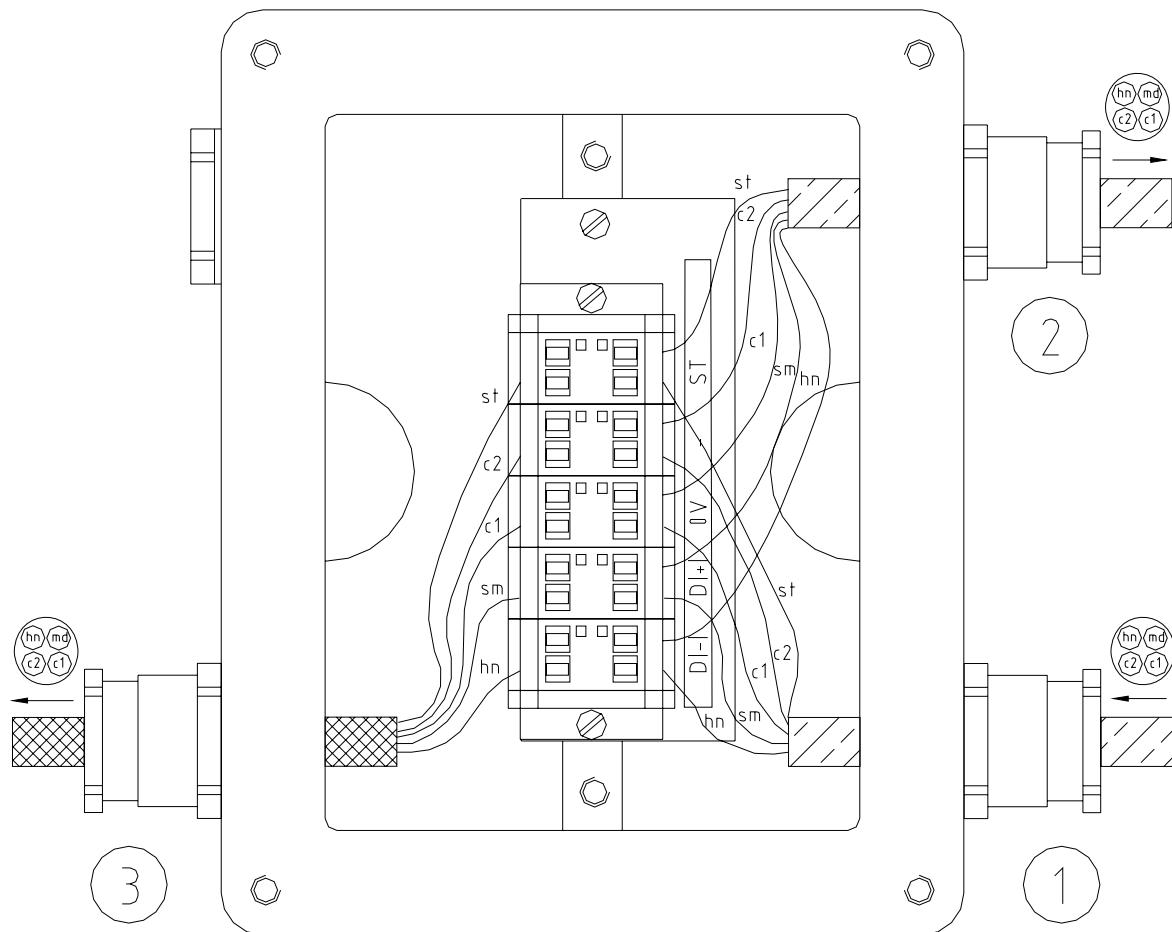
2 Shielded Data Line Cable		
Type: CMFM 4D x 1.0 (recommended)		
Connection: XT13 <--> next dispenser		
A	Line A	brown (hn)
B	Line B	light blue (sm)
-	not used	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

3 Shielded Data Line Cable		
Type: CMFM 4D x 0.5		
Connection: XT13 <--> dispenser's counter		
A	Line A	brown (hn)
B	Line B	light blue (sm)
-	not used	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be used only clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.8. Data line distribution box scheme - XT13a



Input

1	Shielded Data Line Cable Type: CMFM 4D x 1.0 (recommended) Connection: kiosk/dispenser <--> XT13a	
D(-)	signal DATA(-)	brown (hn)
D(+)	signal DATA(+)	light blue (sm)
OV	signal ground	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

Output

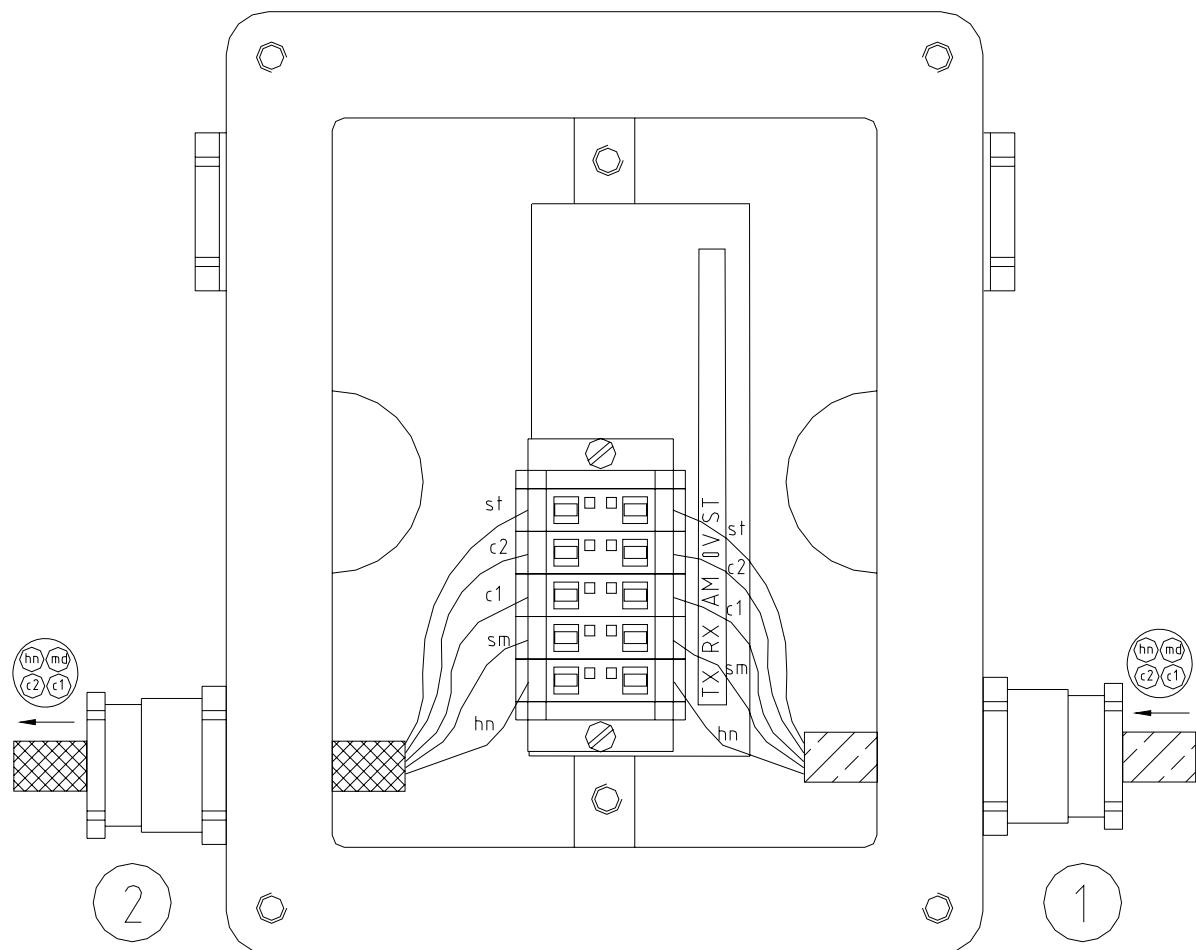
2	Shielded Data Line Cable Type: CMFM 4D x 1.0 (recommended) Connection: XT13a <--> next dispenser	
D(-)	signal DATA(-)	brown (hn)
D(+)	signal DATA(+)	light blue (sm)
OV	signal ground	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

3	Shielded Data Line Cable Type: CMFM 4D x 0.5 Connection: XT13a <--> dispenser's counter	
D(-)	signal DATA(-)	brown (hn)
D(+)	signal DATA(+)	light blue (sm)
OV	signal ground	black1 (c1)
-	not used	black2 (c2)
ST	shield	shield (st)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be used only clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

G.9. Data line distribution box scheme - XT15



Input

1	Shielded Data Line Cable Type: CMFM 4D x 1.0 (recommended) Connection: kiosk <---> XT15	
TX	signal Tx	brown (hn)
RX	signal Rx	light blue (sm)
AM	signal Automat / Manual	black1 (c1)
OV	signal ground	black2 (c2)
ST	shield	shield (st)

Output

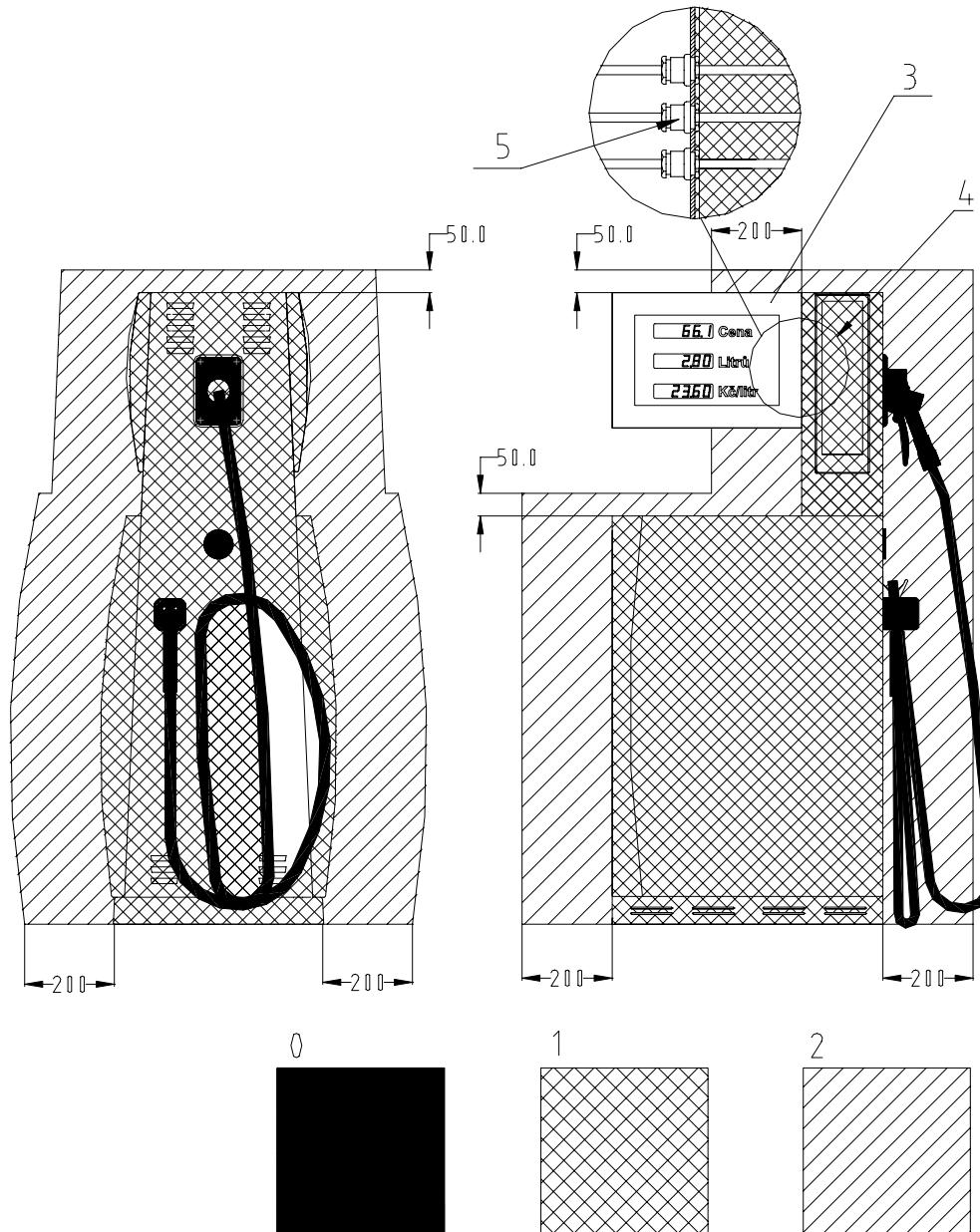
2	Shielded Data Line Cable Type: CMFM 4D x 0.5 Connection: XT15 <---> dispenser's counter	
TX	signal Tx	brown (hn)
RX	signal Rx	light blue (sm)
AM	signal Automat / Manual	black1 (c1)
OV	signal ground	black2 (c2)
ST	shield	shield (st)

Notes:

Distribution box type RK 002/6 is approved Ex II 2G EEx e II T6 with certificate FTZÚ 02 ATEX 0021. Inside box should be used only clamps WAGO type 262-130 and 262-230, that are approved EEx e II. Maximum load of the one clamp is 10A/400V. Allowed wire cross-sections are in range from 0.5 to 2.5 mm². Length of unisolated part of wire is min. 9 mm and max.. 10 mm.

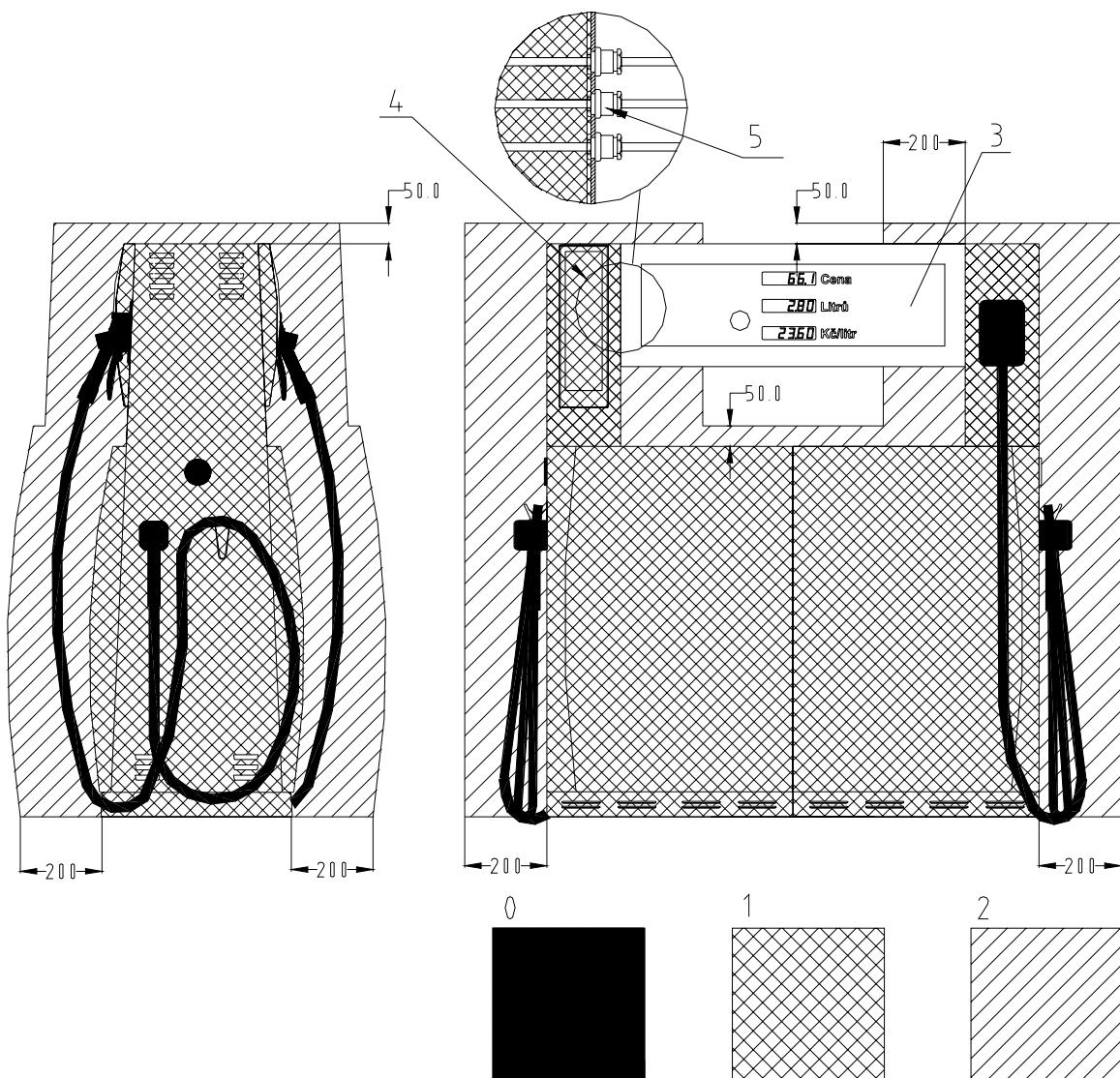
Appendix J – Ex zones

J.1. Zones for BMP511.S/LPG according to ČSN EN 13617-1



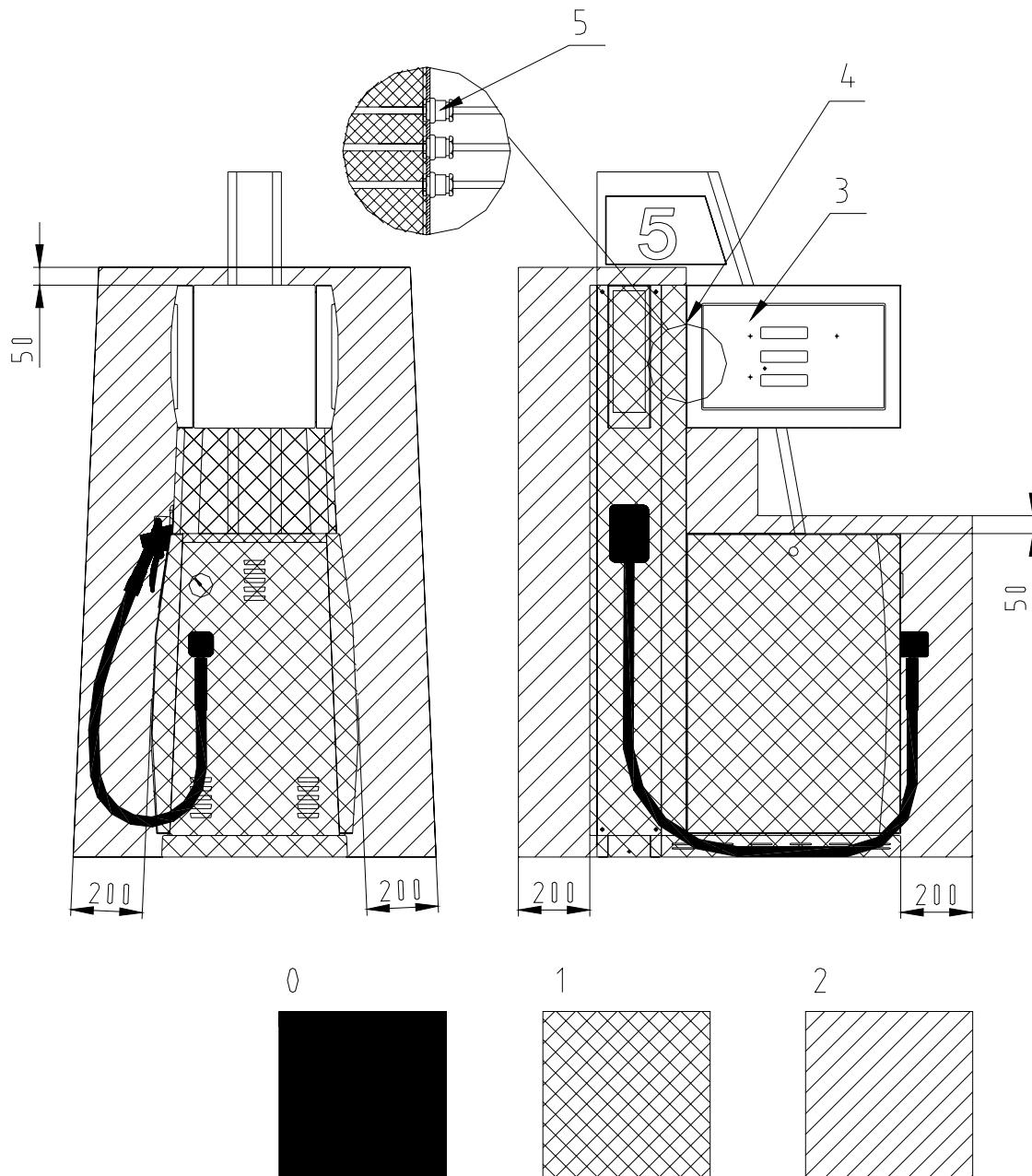
Pos.	Description	Pos.	Description
0	Zone 0	3	Space without danger - nonexplosive (IP54)
1	Zone 1	4	Vertikal partition - type 1 (detail)
2	Zone 2	5	Nonexplosive cable bushing EEx e II (IP67)

J.2. Zones for BMP522.S/LPG according to ČSN EN 13617-1



Pos.	Description	Pos.	Description
0	Zone 0	3	Space without danger - nonexplosive (IP54)
1	Zone 1	4	Vertikal partition - type 1 (detail)
2	Zone 2	5	Nonexplosive cable bushing EEx e II (IP67)

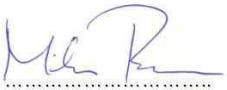
J.3. Zones for BMP2000.S/LPG according to ČSN EN 13617-1



Pos.	Description	Pos.	Description
0	Zone 0	3	Space without danger - nonexplosive (IP54)
1	Zone 1	4	Vertikal partition - type 1 (detail)
2	Zone 2	5	Nonexplosive cable bushing EEx e II (IP67)

Appendix K – Certificates

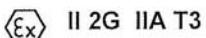
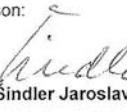
K.1. EC conformity certificate for BMP500.S /LPG

	<i>ES0500LPG_ENG_V1</i>	TATSUNO-BENČ EUROPE a.s. Pražská 2325/68 678 01 Blansko Czech republic Registration No: 26221454						
ES – DECLARATION OF CONFORMITY								
<p>Hereby we declare that the product:</p> <p>Electronic Fuel Liquefied Petroleum Gas Dispensers Type series BMP 5XX.S/LPG</p> <p>Purpose and scope of product use:</p> <p>The equipment serves for pumping of liquefied petroleum gas</p> <p>Complies with the technical requirements contained in the harmonized technical standard and regulations of the EC-Directives:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 50%;">Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC</td> <td style="width: 50%;">Electromagnetic compatibility 89/336/EC</td> </tr> <tr> <td colspan="2" style="text-align: center;">EN 14678-1:2006, ČSN EN 60204-1:2000</td> </tr> <tr> <td colspan="2" style="text-align: center;">ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)</td> </tr> </table> <p>The producer certifies hereby, that properties of the above-mentioned equipment meet all requirements set by the quoted technical standards and the EC-Directives above and the equipment is safe for the specified scope of use.</p> <p>We have adopted the measures by which conformity of commissioned equipment with technical documentation and basic requirements is provided and guaranteed.</p> <p>The said equipment was certified as the product by The Physical Technical Testing Institute Ostrava-Radvanice, notified body number 1026. On the basis of carried out certification the Type Certificate No. FTZÚ 03 ATEX 0025 was issued on May 5, 2003. EMC was verified by the Czech metrological institute, testing laboratory No.1341 Praha and the Test Reports No.113-PT-9004-05, 113-PT-9005-05 and 113-PT-9006-05 were issued on June 30, 2005.</p> <p>Place and Date of issue: Name and Signature of the authorize persons:</p> <p style="text-align: right;">Blansko, June 20, 2006</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Dipl.-Ing. Milan Berka Technical Director Manager QS</p> </div> <div style="text-align: center;">  <p>Dipl.-Ing. Zdeněk Černošek Director</p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p><i>Katalog QS - dokument č. ES0500LPG_ENG_V1.pdf</i></p> </div>			Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC	Electromagnetic compatibility 89/336/EC	EN 14678-1:2006, ČSN EN 60204-1:2000		ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)	
Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC	Electromagnetic compatibility 89/336/EC							
EN 14678-1:2006, ČSN EN 60204-1:2000								
ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)								

K.2. EC conformity certificate for BMP2000.S /LPG

	<i>ES2000LPG_ENG_V1</i>	TATSUNO-BENČ EUROPE a.s. Pražská 2325/68 678 01 Blansko Czech republic Registration No: 26221454						
ES – DECLARATION OF CONFORMITY								
<p>Hereby we declare that the product:</p> <p>Electronic Fuel Liquefied Petroleum Gas Dispensers Type series BMP 2XXX.S/LPG</p> <p>Purpose and scope of product use:</p> <p>The equipment serves for pumping of liquefied petroleum gas</p> <p>Complies with the technical requirements contained in the harmonized technical standard and regulations of the EC-Directives:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC</td> <td style="width: 50%;">Electromagnetic compatibility 89/336/EC</td> </tr> <tr> <td colspan="2">EN 14678-1:2006, ČSN EN 60204-1:2000</td> </tr> <tr> <td colspan="2">ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)</td> </tr> </table> <p>The producer certifies hereby, that properties of the above-mentioned equipment meet all requirements set by the quoted technical standards and the EC-Directives above and the equipment is safe for the specified scope of use.</p> <p>We have adopted the measures by which conformity of commissioned equipment with technical documentation and basic requirements is provided and guaranteed.</p> <p>The said equipment was certified as the product by The Physical Technical Testing Institute Ostrava-Radvanice, notified body number 1026. On the basis of carried out certification the Type Certificate No. FTZÚ 03 ATEX 0025 was issued on 5 of May 2003. EMC was verified by the Czech metrological institute, testing laboratory No.1341 Praha and the Test Reports No.113-PT-9004-05, 113-PT-9005-05 and 113-PT-9006-05 were issued on June 30, 2005.</p> <p>Place and Date of issue: Name and Signature of the authorize persons:</p> <p>M. Berka Dipl.-Ing. Milan Berka Technical Director Manager QS</p> <p>Z. Černošek Dipl.-Ing. Zdeněk Černošek Director</p> <p><i>[Signatures]</i></p> <p style="text-align: center;"><i>Blagsko, June 20, 2006</i></p> <p style="text-align: center;">TATSUNO BENČ TATSUNO BENČ EUROPE a.s. Pražská 68, 678 01 Blansko P.O. BOX 49, Czech Republic e-mail: benc@benc.cz, IČO: 26221454 phone +420 0306 428411, fax +420 506 428410</p> <p style="text-align: center;"><i>Katalog QS - dokument č. ES2000LPG_ENG_V1.pdf</i></p>			Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC	Electromagnetic compatibility 89/336/EC	EN 14678-1:2006, ČSN EN 60204-1:2000		ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)	
Equipment and protective systems intended for use in potentially explosive atmosphere 94/9/EC	Electromagnetic compatibility 89/336/EC							
EN 14678-1:2006, ČSN EN 60204-1:2000								
ČSN EN 61000-6-3, ČSN EN 61000-6-4, TEST REPORT OIML R117/R118:1995(E)								

K.3. EC type certificate - ATEX

	<p>Physical Technical Testing Institute Ostrava-Radvanice</p> 	
<p>Supplement No. 1 to EC-Type Examination Certificate</p>		
<p>Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC</p>		
(3) EC-Type Examination Certificate Number: FTZÚ 03 ATEX 0025		
(4) Equipment or protective system: LPG dispensers, type series SHARK BMP 5xx.S/LPG, SHARK BMP 2xxx.S/LPG		
(5) Manufacturer: TATSUNO – BENČ EUROPE, a.s.		
(6) Address: Pražská 68, P.O.Box 49, 678 01 Blansko, Czech republic		
(7) This supplement of certificate is valid for: - modification of certified product		
(8) Modification of certified apparatus (protective system) and any of its approved variants are specified in documentation, list of which is mentioned in schedule of this certificate.		
(9) This supplement to type examination certificate is valid only for type examination of design and construction of product sample in accordance with Annex 3 Paragraph 6) of Directive No. 94/9/EC. The Directive contains another requirement, which manufacturer shall fulfil before products are place on market or introduce in service.		
(10) Safety requirements of modified parts were fulfil by satisfying of following standards: prEN 14678-1:2003; ISO 11925-3:1997 (E), cl. 9.7		
(11) Marking of equipment designed according to this supplement shall contain symbols: 		
(12) This type examination certificate is valid till: 31.03.2008		
Responsible person:  Dipl. Ing. Sindler Jaroslav Head of certification body		Date of issue: 25 of August 2005  Number of pages: 5 Page: 1/5
<p>This supplement to certificate is granted subject to the general conditions of the Physical Technical Testing Institute. This supplement to certificate may only be reproduced in its entirety and without any change, schedule included.</p>		
<p>FTZÚ, Pikartská 7, 716 07 Ostrava Radvanice, tel +420 595 223 111, fax +420 596 232 672, e-mail: ftzu@ftzu.cz</p>		

K.4. Metrological type certificate



K.5. ISO 9001:2000 certificate



Grafika 39

K.5. OIML R117&R118 Test Report

**CZECH METROLOGY INSTITUTE**

Český metrologický institut, Oblastní inspektorát Brno
Okružní 31, 638 00 Brno, Czech Republic
Accredited Testing Laboratory No. 1341.2

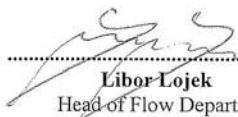


TEST REPORT FOR PATTERN EVALUATION OF MEASURING SYSTEMS FOR LIQUIDS OTHER THAN WATER

No. 6031-PZ-P006-06

Date of issue: August 18, 2006

Page 1 of 29


.....
Libor Lojek
Head of Flow Department



Pattern: LPG dispenser for motor vehicles
Designation: SHARK BMP 5xx.S/LPG and 2xxx.S/LPG
Manufacturer: TATSUNO-BENČ EUROPE, a.s., Pražská 68, 678 01 Blansko,
Czech Republic
Applicant: TATSUNO-BENČ EUROPE, a.s., Pražská 68, 678 01 Blansko,
Czech Republic
Method of testing: OIML R 117 Edition 1995 (E)
Subcontracted tests: -

Appendix L – LPG Filter Change

L.1. Occupational Safety Instructions



CAUTION

- The equipment has to be installed by the staff qualified and authorized pursuant to relevant standards, regulations, local limitations and pursuant to the Manual.
- Smoking and open fire handling is prohibited in the vicinity of the dispenser.
- Always adhere to the rules for LPG handling.
- Monitor all leaks in the dispenser. Should you establish fuel leaks, disconnect power supply line and contact the service organization.
- El. wiring must be carried out by the qualified staff.
- Assure that the operable fire extinguisher is available.
- When handling the device, use suitable protective aids.

CAUTION

Prior to start any maintenance intervention into mechanical, hydraulic or electric parts / assemblies, it is always necessary to disconnect the fuel dispenser from the power supply source and to protect it from re-connection reliably.

CAUTION

DO NOT OPEN THE JUNCTION BOX COVER IF THE FUEL DISPENSER IS ENERGIZED !

CAUTION

Each handling and dismantling operation of the parts and assemblies above (even filter cover opening) is conditioned by forcing the medium out of the fuel dispenser hydraulic system, using nitrogen or inert gas!

Electric and electronic parts/assemblies may be serviced only and exclusively by the specialist liable for safety of the device. After completed intervention the conductors must be reinstated. Correct conductor installation must prevent any contact with the moving parts of the winding module.

Caution! After each service intervention tightness of hydraulic assemblies has to be inspected; possible medium leaks have to be removed.

L.2. LPG Filter Change

To change LPG filter follow these steps:

- close input ball valve (1) and output ball valve (2)
- disconnect liquid phase inlet and vapour phase outlet from technology (LPG reservoir).
- connect nitrogen pressure vessel to liquid phase inlet of dispenser (pressure in vessel must be higher than pressure inside LPG dispenser)
- connect LPG dispensing nozzle to LPG reservoir and open input ball valve (1).
- start fuelling and slowly open dispensing nozzle. LPG will be slowly extruded from dispenser by nitrogen. Liquid inside sightglass (15) disappear.
- stop fuelling, close dispensing nozzle and close input ball valve (1)
- disconnect nitrogen pressure vessel. Now the dispenser is filled by nitrogen and disconnected from technology.
- close input ball valve (1) and output ball valve (2)
- deflate content of vapour separator and filter by release the cap (3).

NOTE

Vapour separator cap (3) is missing in case of old type of the LPG dispensers. Therefore is necessary to deflate content of vapour separator and filter by release the pipe screw connection (4) or (5).

IMPORTANT

Vapour separator and filter contains approx. 3 litres of liquified propane butane. During deflating from dispenser the gas is evaporating and the pipes are freezing. Therefore is necessary to deflate dispenser very slowly and with patience. The deflating terms about 30 minutes. **It is important to not release the caps or pipe screws totally to avoid their fire out.**

- after deflating of the gas from vapour separator and filter and pressure drop to 0 bar it is necessary to screw out the filter bottom (6) from the filter body (7).
- remove filter (16) and change for other one (paper filter), or clean filter by pressure air (metal filter).
- insert filter back, screw in filter body and fasten all pipe screw connection
- connect liquid phase inlet and vapour phase outlet into technology (LPG reservoir).
- open input ball valve (1) and output ball valve (2)

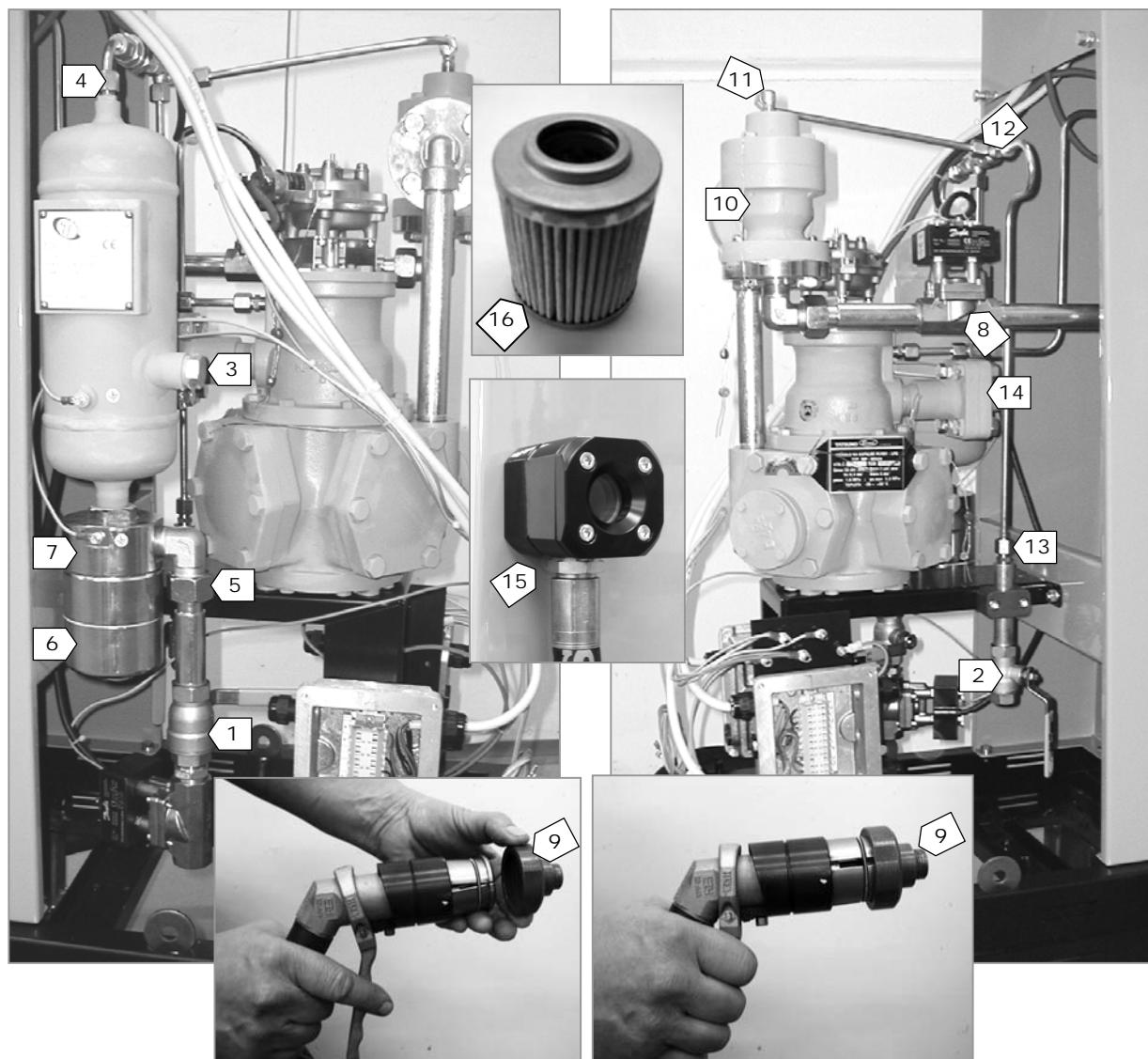
L.2. Deflating of LPG dispenser

Total deflating of the LPG dispenser is following:

- close input ball valve (1) and output ball valve (2)
- disconnect liquid phase inlet and vapour phase outlet from technology (LPG reservoir).
- connect nitrogen pressure vessel to liquid phase inlet of dispenser (pressure in vessel must be higher than pressure inside LPG dispenser)
- connect LPG dispensing nozzle to LPG reservoir and open input ball valve (1).
- start fueling and slowly open dispensing nozzle. LPG will be slowly extruded from dispenser by nitrogen. (liquid inside sightglass disappear).
- stop fuelling, close dispensing nozzle and close input ball valve (1)
- disconnect nitrogen pressure vessel. Now the dispenser is filled by nitrogen and disconnected from technology.
- open valve (1) and (2) . Nitrogen and the rest other gases deflate from dispenser.
- put on dispensing nozzle special cap (9). The shape of the dispensing nozzle cap is the same like LPG filler of the car reservoir.
- start dispenser (fueling) and slowly open dispensing nozzle. Electromagnetic valve (8) is opened and the rest of gases is deflated from dispenser. It is possible to see pressure decrease inside dispenser at the manometer.

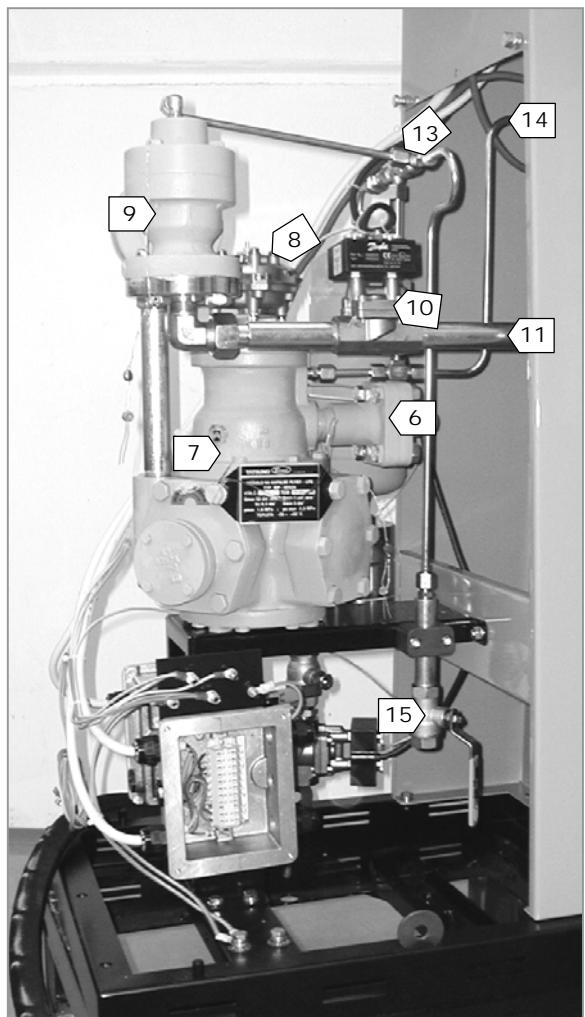
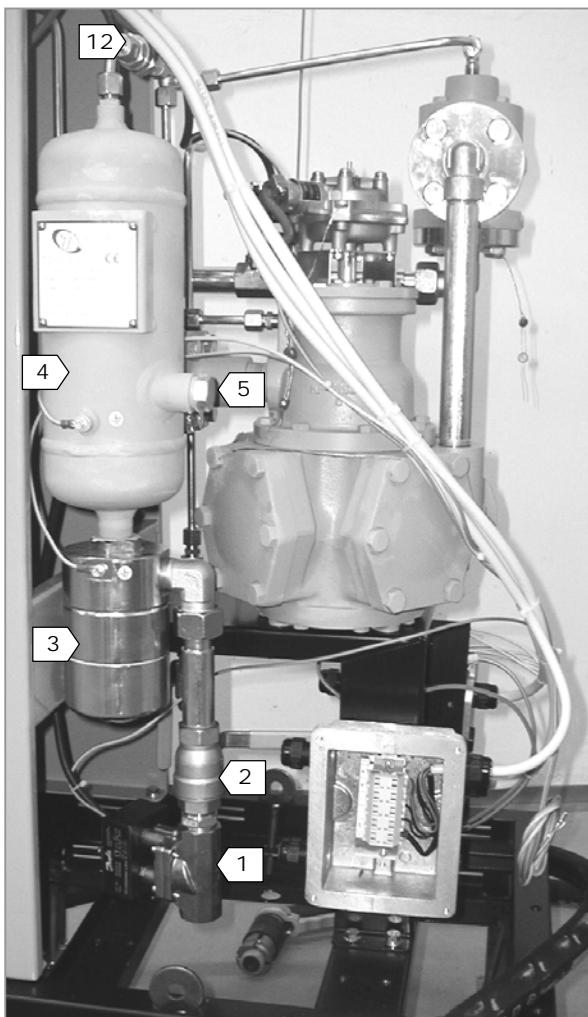
NOTE

Fast gas deflating from dispenser often avoid to automatic close of the differential valve due to pressure compensation inside dispenser. To open differential valve again it is necessary to shortly open output valve (2).

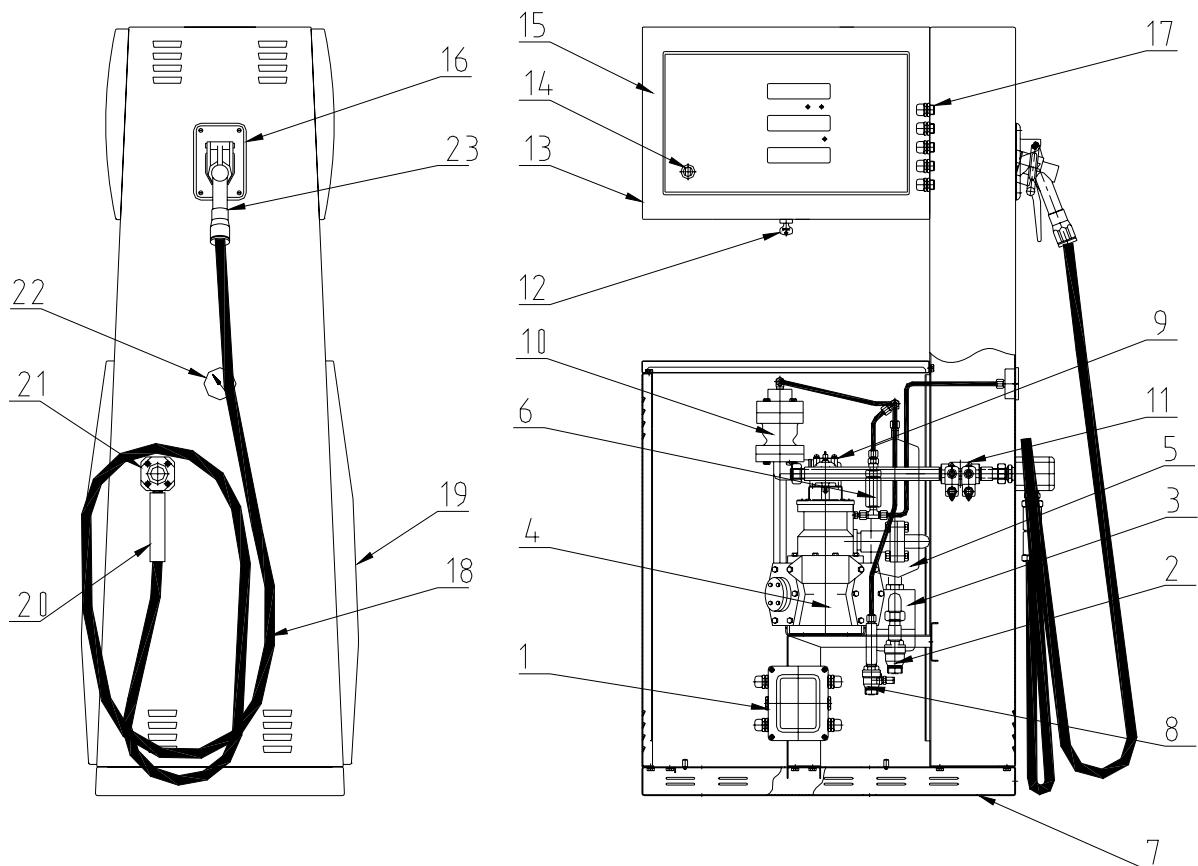


Pos.	Description	Pos.	Description
1	Input Ball Valve for Liquid Phase	9	Special Dispensing Nozzle Cap
2	Output Ball Valve for Vapour Phase	10	Differential valve
3	Vapour Separator Cap	11	Vapour Phase Pipe Screw Connection
4	Vapour Separator Screw Connection	12	Vapour Phase Pipe Screw Connection
5	Filter Input Screw Connection	13	Vapour Phase Pipe Screw Connection
6	Bottom of the Filter	14	Backward Valve
7	Body of the Filter	15	Sight glass
8	Electromagnetic Preselection Valve	16	Filter

Appendix M – LPG Hydraulic Description



Pos.	Description	Pos.	Description
1	Input Electromagnetic Valve for Liquid Phase (option)	9	Differential Valve Tatsuno VD-0206
2	Input Ball Valve for Liquid Phase	10	Electromagnetic Preselection Valve
3	Filter	11	Output Pipe to Sight Glass and Dispensing Nozzle
4	Vapour Separator	12	Backward Valve for Vapour Phase (open when p > 1bar)
5	Input for Temperature Sensor PT100 (option)	13	Vapour Phase Pipes Distribution
6	Backward Valve for Liquid Phase	14	Vapour Phase Pipes to Manometer
7	LPG Flowmeter Tatsuno MP-02524	15	Output Ball Valve for Vapour Phase
8	Measuring Transducer (pulser) Tatsuno EK-1025		



Pos.	Description	Pos.	Description
1	Power / Data Distribution Box	13	Computer Head
2	Input Pipe for Liquid Phase with Ball Valve	14	Start Button (IP54)
3	Filter	15	Plastic Mask
4	LPG Flowmeter Tatsuno MP-02524	16	Nozzle Boot
5	Vapour Separator	17	Cable Glands
6	Backward Valve for Vapour Phase ($p > 1\text{bar}$)	18	LPG Dispensing Hose
7	Foundation	19	Plastic Covers (Doors)
8	Output Pipe for Vapour Phase with Ball Valve	20	Start Button (IP54)
9	Measuring Transducer (pulser) Tatsuno EK-1025	21	Sight Glass
10	Differential Valve Tatsuno VD-0206	22	Manometer
11	Electromagnetic 2-Stage ON/OFF Valve	23	LPG Nozzle
12	Lock		